Research on Gang-Related Violence in the 21st Century

Edited by
Matthew Valasik and Shannon E. Reid
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MDPI

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Editorial

"The More Things Change, the More They Stay the Same": Research on Gang-Related Violence in the 21st Century—Introduction to Special Issue

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The goal of this Special Issue is to examine the diverse nature of gang-related violence in modern life by providing insights into the growing complexities to better direct public policy solutions in the 21st Century. Multiple perspectives and analytical techniques (e.g., quantitative, qualitative, or mixed-methods), across the United States and globally, are necessary to unpack the dynamic nature of gang-related violence today. Work on this Special Issue began just prior to COVID-19 upending the world and with it everyone's daily routines. We would like to thank first and foremost all of the contributors to this Special Issue. Despite the exceptionally challenging life circumstances, each article in this Special Issue highlights novel research methodologies to better understand gang violence and potential interventions to reduce it.

As the patterns of daily life changed with COVID-19 (i.e., quarantines, social distancing, etc.), researchers were frantic to understand how these changes to routine activities impacted all types of crime, from domestic violence (Nix and Richards 2021), to organized crime (De la Miyar et al. 2021), to cybercrime (Hawdon et al. 2020), and everything in between (Halford et al. 2020; Mohler et al. 2020; Rosenfeld and Lopez 2020). Studies generally show that crime patterns varied by the particular type of crime (e.g., theft, robbery, domestic violence, homicide, etc.) suggesting that the changes in the mobility patterns of offenders and victims directly contributes to these trends (Halford et al. 2020). Yet, emerging studies reveal that gang-related violence either remained stable (Brantingham et al. 2021) or increased (Kim and Phillips 2021) during the COVID-19 restrictions. It seems that even a global pandemic is unable to disrupt the prevalence of gang-related violence once it is entrenched in a community (see Valasik et al. 2017). That is, conflict, including the threat or fear of potential violence, remains the principal driver in sustaining gang life.

Dena Carson and Natalie Hipple (Carson and Hipple 2020), in their contribution to this Special Issue, "Comparing violent and non-violent gang incidents: An exploration of gang-related police incident reports," examine gang-related incident reports collected over four years (2015–2019) from the Indianapolis Metropolitan Police Department. They explore the reasons why incidents were attributed to gangs, and compare the characteristics of violent, drug, and non-violent gang-related incidents. Their analyses focus on examining the incident characteristics that influence a reporting officer's categorization of an incident as being gang-related and differentiating between violent, drug, and other non-violent crimes. Carson and Hipple find that non-violent crimes make up the bulk of gang-related incidents, followed by drug and then violent crimes. In fact, few incidents are labeled as gang-related by police and the prevalence is decreasing annually. Furthermore, violent crime incidents were more likely to be brought to the attention of the police through calls for service, with it being rare for police to observe violent gang-related activity during routine patrols. Overall, this study's findings are valuable to policy makers, criminal justice actors, and local agencies that work with gang members, since most (62%) of the

gang-related incident reports involve non-violent offenses, requiring programs and policies to address more than just violence.

Matthew Valasik and Shannon Reid (Valasik and Reid 2021), in "East Side Story: Disaggregating Gang Homicides in East Los Angeles", argue that gang-related homicides are not monolithic but have significantly distinct characteristics. Their study discusses the variation in the circumstances, motives, setting, participant characteristics, and rivalry relationship present in gang-related homicides to see how they vary from one another. Using Latent Class Analysis (LCA) to classify cases into mutually exclusive types (classes), Valasik and Reid examine gang-related homicides in the LAPD's Hollenbeck Community Policing Area between 1990 and 2012. The results reveal five mutually exclusive classes of gang-related violence that are distinct from each other. Valasik and Reid's study provides evidence that patterned variation exists in gang-related homicides, arguing that disaggregation should be a regularly employed tool to understand the unique differences between classes of gang-related homicides for policy, law enforcement response, and research.

Civil gang injunctions (CGIs) have been a crime control strategy used to target the most violent street gangs by imposing behavioral restrictions on enjoined gang members (e.g., prohibitions against congregating in public) within a designated area (e.g., a gang's claimed turf) with the hopes of deterring gang violence. The City of Los Angeles, in particular, has adopted this tactic. Gisela Bichler, Alexis Norris, and Citlalik Ibarra (Bichler et al. 2020), in "Evolving Patterns of Aggression: Investigating the Structure of Gang Violence during the Era of Civil Gang Injunctions", examine the four social networks generated from violent incidents occurring between the years 1998 and 2013 involving enjoined gang members. The novel data were generated by linking defendants and victims named in 963 prosecutions involving street gangs enjoined with a CGI. Bichler and colleague's goal is ascertaining whether the substantive shifts in the structure of violence correspond with phases of CGI adoption in Los Angeles. Exploring the structure of conflict through a triad census, their findings reveal that across time periods, a substantial number of simple structures reflect a domino pattern of aggression. That is, one group attacks another, who then attacks a third group. Bichler and colleagues suggest that this structure of violence indicates that not all gangs are equal, with some gangs being unable to retaliate and instead prey upon weaker groups. Additionally, there was a substantial change after CGIs were introduced, with many simple structures of violence shifting to more complex patterns. The findings reveal that enjoined gangs were more likely to attack other enjoined gangs, and excessively aggressive gangs were less likely to be victimized. This study provides support for targeted enforcement strategies being able to facilitate change in gang violence; however, as more and more injunctions were enacted the nature of gang conflict became more complex. As such, the disruption of future gang violence may become more challenging in the long-term.

Alice Airola and Martin Bouchard's (Airola and Bouchard 2020) contribution, "The Social Network Consequences of a Gang Murder Blowout," also utilizes social network analysis (SNA), but focuses on a sole gang, Red Scorpion, whose members were involved in the Surrey Six Murder, one of the deadliest gang-related homicides in Canada. By using SNA, Airola and Bouchard are able to examine the network consequences for the organization and its members resulting from this gang-related homicide. The following three types of ties are focused on in the network: trust ties (strong), business ties (weak), and conflict ties (negative). Airola and Bouchard compare the different social ties and the level of control during the conspiracy phase and the post-murder phase, revealing that the fragmentation and network size increased post-murder, whereas the Red Scorpion's network density and centralization decreased. Similar to the terrorist group, Toronto 18, Red Scorpion's network showed signs of fragmentation after crisis as the role of the leader was diminished after the murder. In addition, following the murder, the proportion of trust ties increased and so did the number of positive and balanced cliques, which, as Airola and Bouchard argue, suggests that such strong ties are effective at maintaining the information flow and control of a group when facing a crisis. This unique case study

provides glimpses into how the composition of street gangs are not static structures but change in response to stimuli, for instance a law enforcement murder investigation and prosecution, and should be kept in mind when such groups are targeted with intervention and/or suppression strategies.

Marta Urbanik and Robby Roks' (Urbanik and Roks 2021) article, "Making Sense of Murder: The Reality versus the Realness of Gang Homicides in Two Contexts," employs a multi-site (Canada and the Netherlands) ethnographic approach to illuminate how gang members experience their associates' murder(s). Particular attention focuses on how gang members make sense of and respond to the fatalities of their peers. Gang members in both Canada and the Netherlands made sense of and navigated a fellow member's murder(s) by conducting pseudo-homicide investigations, being hypervigilant, and attributing blame to the victim. They discussed potential suspects and motives, reviewed eyewitness reports, and analyzed crime scene photos published by the local media. Urbanik and Roks find that following a gang-related murder, fellow gang members are more likely to carry a weapon, pay extra attention to strangers, minimize their presence outdoors, and share suspicions about who may be responsible. In the Netherlands, a gang member's murder planted doubts about the function and necessity of defending a gang's claimed turf. While in Canada, many gang members became desensitized and accustomed to the routineness of fellow gang members being murdered, with these events breeding distrust between group members. Urbanik and Roks' approach is eye-opening, providing an alternative data source that is not police generated and is better able to unpack the micro processes associated with gang-related homicides.

In another multi-site study (two east coast cities in the United States), Caterina Roman, Meagan Cahill, and Lauren R. Mayes' (Roman et al. 2021) article, "Changes in Personal Social Networks across Individuals Leaving Their Street Gang: Just What Are Youth Leaving Behind?", analyzes the changes in a gang member's personal network composition as it is associated with changes in a gang member's membership stage. Using novel survey data, Roman and colleagues observe notable differences between individuals who reported leaving their gang and fully disengaging from their gang associates, and those who report leaving but still interact with their gang friends. The results indicate that the individuals who fully disengaged from their street gang acquired more prosocial relationships and reduced some of their criminal behavior. For those who left their gang but still interact with fellow gang members, however, there were limited changes for both criminal behavior and network composition over time. Roman and colleagues contend that a complete withdrawal from interaction with old gang members is likely followed by large changes in the composition of social networks, particularly if prosocial relationships can be established. This study supports the notion that crime desistance is more clearly tied to full disengagement than simply de-identification as a gang member. These findings suggest that gang intervention programs that use street outreach workers may be an effective strategy to reduce violence and put high-risk individuals and gang members on prosocial paths.

A gang intervention that has consistently been shown as an effective strategy at reducing gang-related violence is focused deterrence. Involving a mixture of strong enforcement messages from law enforcement officials that stress the costs and consequences of gun violence combined with the promise of additional social support and resources, focused deterrence has been employed across many jurisdictions over the last thirty years. Focused deterrence was implemented in Philadelphia between 2013 and 2016, resulting in a significant decrease in shootings; however, the effect on targeted gangs was not universal, with some showing no change or an increase in gun-related activity. Jordan Hyatt, James Densley, and Caterina Roman (Hyatt et al. 2021), in "Social Media and the Variable Impact of Violence Reduction Interventions: Re-Examining Focused Deterrence in Philadelphia," study the extent to which social media may explain this differential. Specifically, does social media's use as a venue for communication diminish the robustness of a focused deterrence message, which focuses on reinforcing a sense of collective accountability. Employing data

on group-level social media usage and content, Hyatt and colleagues reveal that all street gangs have an online presence and promoted violence in almost one-third of their postings. Furthermore, gangs with more shootings are younger with slightly larger memberships, suggesting that these groups are likely to have a higher overall social media usage score and a larger, more visible footprint on the internet. While the social media posts that are considered to be an immediate threat did not correlate with an increase in shootings during a focused deterrence period, instead the broader pattern of online engagement was associated with an increased level of risk. These findings support the link between the online activity of gang members and violence on the streets, especially shootings. As such, this study reinforces the need to not ignore social media when developing harm-prevention interventions, including focused deterrence, for gang-involved individuals.

A novel approach to street gang intervention is the Good Lives Model (GLM), a strengths-based framework for offender rehabilitation. Mallion and Wood (2020), in "Street Gang Intervention: Review and Good Lives Extension," maintain that this public health approach to gang membership assumes that criminal behavior occurs when individuals are unable to attain their goals through prosocial means and will instead attempt to achieve these goals through any means necessary, including antisocial behaviors. For gang members in particular, gangs may provide a sense of protection and support, yet there is also an increased risk of violent victimization and mental illness. Mallion and Wood highlight that GLM interventions aim to develop an individual's internal (i.e., skills and values) and external capacities (i.e., resources, support, and opportunities). Current prevention and intervention strategies are limited in their effectiveness, as the benefits of belonging to a gang (e.g., protection, social and emotional support, sense of identity) extend beyond the normal proceeds of crime (i.e., financial or material gain) and are generally not adequately targeted in traditional interventions. GLM-consistent interventions provide a relatively new framework that may increase client engagement and motivation to change.

Lastly, "Exploring the Influence of Drug Trafficking Gangs on Overdose Deaths in the Largest Narcotics Market in the Eastern United States" by Nicole Johnson, Caterina Roman, Alyssa Mendlein, Courtney Harding, Melissa Francis, and Laura Hendrick (Johnson et al. 2020) investigates whether deaths from accidental drug overdose are clustered around street corners controlled by drug trafficking gangs in a large neighborhood in Philadelphia, Pennsylvania. Using a concentration metric, the Rare Event Concentration Coefficient, to assess clustering of overdose deaths annually between 2015 and 2019, the study reveals that overdose deaths became less clustered over time. Johnson and colleagues find several socio-structural factors that are associated with a higher rate of overdose deaths, including concentrated disadvantage and physical environmental factors (e.g., dilapidated or deteriorated housing). Additionally, both the gang corner status and the proximity to a street gang were significantly related to the rate of overdose incidents on each street corner. The findings suggest that programs seeking to address overdose deaths should be both mobile and be specifically targeted to risky places. Implications of this study highlight the need for efforts to strategically coordinate law enforcement and social service provisions and reduce deteriorated housing stock would be the most effective at reducing drugs, other crime, and overdoses.

The contributions included in this Special Issue highlight the complex nature of gang-related violence in the 21st Century. As much as policy makers, the media, and even scholars like to simplify gang-related violence, all of the above studies highlight the nuance and variation that exists. Furthermore, tried and true approaches (e.g., homicide disaggregation) and interventions (e.g., focused deterrence, CGIs) should be reviewed and brought into the 21st Century to address gang-related violence effectively and appropriately in the present day. Through the use of novel data and methods, the studies presented in this Special Issue reinforce this need. Gang-related violence is a persistent beast, difficult to dislodge from communities and, as society begins to reopen from the COVID-19 pandemic and return to our daily routines, it will be there waiting for us to reemerge.

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Article

Comparing Violent and Non-Violent Gang Incidents: An Exploration of Gang-Related Police Incident Reports

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Abstract: Prior research has established a strong link between gangs and violence. Additionally, this connection is demonstrated across multiple methodologies such as self-report surveys, qualitative interviews, as well as official records. Officially recorded gang data can be increasingly hard to obtain because data collection approaches differ by agency, county, city, state, and country. One method for obtaining official gang data is through the analysis of police incident reports, which often rely on police officers' subjective classification of an incident as "gang-related." In this study we examine 741 gang-related incident reports collected over four years from the Indianapolis Metropolitan Police Department. This study will explore reasons why incidents were attributed to gangs as well as compare the characteristics of violent, drug, and non-violent gang-related incidents. This work has implications for understanding the complexities associated with gang incident reports as well as for the commonality of violent gang crimes.

Keywords: gang; violence; incident reports; police data

1. Introduction

The link between gangs and violence is well-established in prior literature, which has resulted in gang researchers naming violent behavior as one of the key features of gang life (Carson et al. 2017; Decker 1996; Irwin-Rogers et al. 2019; Pyrooz et al. 2016). This strong relationship between gangs and violence persists across time, geographic location, and appears regardless of the research methodology (e.g., ethnographies, survey data, official records). Early ethnographic gang researchers identified themes surrounding violent behavior (Thrasher [1927] 1963; Yablonsky 1962) and more recent ethnographic research discusses gang-related violence in the United States (U.S.) and other countries (Andell 2019; Brenneman 2012; Decker and Winkle 1996; Densley 2013; Deuchar 2018; Garot 2010; Ward 2013; Weaver 2016). Individual-level survey data that compare violence among gang and non-gang youth find that violent offenses are overwhelmingly committed by gang youth (Esbensen et al. 2010; Melde and Esbensen 2013; Pyrooz et al. 2016; Thornberry et al. 2003). The link between gangs and violence is also echoed in the analysis of police homicide data from several cities across the United States (U.S.) (Adams and Pizarro 2014; Huebner et al. 2016; Papachristos et al. 2015; Papachristos et al. 2013; Pizarro and McGloin 2006; Pyrooz et al. 2010; Pyrooz et al. 2011; Rosenfeld et al. 1999).

While it is important to understand the violent nature of gangs, researchers often find that gangs and gang members are involved in other types of non-violent offending. The "cafeteria-style" nature of offending among gang members is largely supported in both qualitative (Decker and Winkle 1996; Fleisher 1998; Lauger 2012; Miller 2001) and survey research (Esbensen and Carson 2012; Thornberry

1998; Thornberry et al. 2003; Weerman and Esbensen 2005). However, due to the emphasis on using police data to understand gang-involved homicides, we know less about other gang-related crimes that come to the attention of the police. This gap in the literature is partially due to law enforcement practices that may limit the range of offenses that are labeled gang-related. Research by Decker and Kempf-Leonard (1991) as well as Klein and Maxson (2006) suggest that law enforcement agencies are restrictive in their definitions of gang activity and may fail to attribute non-violent crime to gangs.. While the research shows that gang members may specialize in violence (Melde and Esbensen 2013; Pyrooz and Decker 2013) and that there is a benefit to understanding gang-motived homicides, see (Rosenfeld et al. 1999), a narrow focus on violent gang incidents can reinforce the stereotype that gangs are *only* involved in violence (Klein and Maxson 2006).

In addition to a heavy focus on violent gang acts, there is a high degree of variation across cities and agencies in the identification of an incident as gang-related (Kennedy et al. 1997; Maxson and Klein 1990; Pyrooz et al. 2011). Research on gang homicides demonstrates that some law enforcement agencies label incidents as gang-motivated (i.e., those that result from gang operations such as turf wars or gang rivalries), while other agencies use a much less restrictive definition of gang-related crimes (i.e., those that involve a gang member) (Curry et al. 1996; Maxson et al. 2002; Maxson et al. 1985). Other agencies may not have clear standards on what crimes should be or are labeled as gang-related. These definitional discrepancies result in very different representations of gang crime (Maxson and Klein 1990) and make it extremely difficult to generalize research findings or policy implications to different cities and contexts.

A lack of definitional consistency and a failure to recognize the broad range of offenses that gang members are involved in has major implications for criminal justice responses as well as the social construction of gangs (Decker and Kempf-Leonard 1991; McCorkle and Miethe 1998). Additionally, attributing a crime, especially a violent crime, to a gang or gang member has implications for the prosecuting of these offenses (Pyrooz et al. 2011) and can activate gang enhancements in charging and sentencing. These enhancements can drastically change the length of a prison sentence (Hall 2019). Despite these serious implications, we have little empirical knowledge—especially for non-violent crimes—about why crime incidents are attributed to gangs.

In an attempt to build knowledge in the area, we draw data from 741 police incident reports that the reporting officer labeled as a gang-related incident. These incidents occurred in the American city of Indianapolis, Indiana from 2015 to 2019. Indianapolis is a Midwestern city located in the "Crossroads of America." The city spans roughly 400 square miles. In 2019, the U.S. Census Bureau estimated the city population to be roughly 886,000 making it the 17th most populous city in the U.S. In 2018, driven by gun violence, Indianapolis experienced 1278 violent crimes per 100,000 people compared to the national average of 369 per 100,000 people (Federal Bureau of Investigation 2018). The Indianapolis Metropolitan Police Department (IMPD) is the largest law enforcement agency in Indiana employing roughly 1700 sworn officers. IMPD is ranked consistently as one of the 30 largest police departments in the U.S.[1] Given these numbers, we believe that Indianapolis provides a suitable setting for our research goals. Our first goal is to explore the reasons why reporting officers labeled an incident as gang-related. Our second goal is to compare characteristics of violent, drug, and other non-violent gang-related incidents.

2. The Validity of Police Perceptions of Crime

The empirical use of official police data and incident reports is common practice in criminology and criminal justice literature. While use of these data are essential for improving our understanding of crime, they were not intended for research purposes and scholars using these data have pointed to a number of methodological limitations (Alison et al. 2001; Katz et al. 2012; Levitt 1998). These include

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[1] http://www.bjs.gov/index.cfm?ty=pbdetail&iid=6706.

variation in the amount of detail provided based on the reporting officer (Alison et al. 2001) as well as a certain amount of reporting bias (Fisher 1993; Levitt 1998). Due in part to these limitations, police records are viewed as having a certain amount of bias (Braga et al. 1994; Goldstein 1990). While these flaws are troubling, other research suggests that police perceptions of crime and gangs in their community are valid generally, as well as for gang research (Decker and Pyrooz 2010; Katz et al. 2000). Braga et al. (1994), for instance, argue that the experiences of law enforcement cause them to develop a detailed sense of crime in certain neighborhoods and the city.

Of relevance to the current study is conceptions about who/what constitutes a gang as well as a gang crime. Difficulties surrounding defining a gang and a gang member plague both academics and practitioners alike (Curry and Decker 1997; Decker et al. 2014; Esbensen et al. 2001; Morash 1983; see, also, Andell (2019) for a broad discussion in the context of the United Kingdom). Police knowledge about gangs is often learned on the job (Decker and Kempf-Leonard 1991) and, therefore, likely to improve with time and experience (Kennedy et al. 1997). Research exploring police perceptions of gangs in their community find that law enforcement is quite knowledgeable about their local gang situation (Kennedy et al. 1997). While law enforcement in some cities have a clear definition of what constitutes gang crime (Maxson and Klein 1990), law enforcement agencies without clear definitional standards may rely on an officer's subjective classification of an incident as gang-related or not. These perceptions, especially among newer officers, may be based on stereotypical, and often inaccurate, depictions of gang-related crime presented by the media (Esbensen and Tusinski 2007; Horowitz 1990). In Kennedy et al.'s (1997) analysis of gang violence in Boston, the authors reported that police officers were quite knowledgeable about gang activity, but tended to believe that almost all homicides committed by youth were perpetrated by gang members and that all youth homicide victims were gang members. This finding indicates that law enforcement might attribute violent acts to gang activity more easily.

Overall, the limitations of data provided by law enforcement underscore the importance of the current work. The news media and policy makers lean heavily upon law enforcement perceptions of gangs and gang crime; therefore, it is exceedingly important to understand the reasons behind the classification of a crime as gang-related as well as variation across crime types. As Decker and Kempf-Leonard (1991, p. 272) note, "the formulation of effective policy responses to gangs depends on reliable and valid foundation of knowledge of the 'gang problem.'"

3. Methodology and Data

Data for this study were initially collected as part of the Southern District of Indiana Project Safe Neighborhoods[2] project. The data come from the Indianapolis Metropolitan Police Department (IMPD) incident records management system (RMS). The RMS is official police record and includes all incidents where a police officer documents an illegal or potentially illegal event (i.e., a police report). This system does not include incidents where the police were called to a scene and determined a crime had not occurred (i.e., calls for police service). When initiating a police report, the authoring officer can use a series of "check-boxes" to indicate if the report is gang-related, domestic violence-related, and/or narcotics-related. The check boxes default to 'no' therefore the reporting officer must initiate a change from 'no' to 'yes.' The sample includes all incident reports where the gang-related box was checked (i.e., indicated yes) from 1 January 2015 through 31 May 2019.[3] Indiana law (IC 35-45-9-1)[4] defines a "criminal gang" as a formal or informal group with at least three members that specifically:

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2   https://www.justice.gov/psn.
3   IMPD changed their RMS in June 2019. The new RMS did not have a similar check-box system.
4   http://iga.in.gov/legislative/laws/2020/ic/titles/035#35-45-9.

(1)   Either:

    (A)   Promotes, sponsors, or assists in;

    (B)   Participates in; or

    (C)   Has as one of its goals; or

(2)   Requires as a condition of membership or continued membership;

The commission of a felony, an act that would be a felony if committed by an adult, or the offense of battery as included in IC 35-42-2.[5]

All law enforcement agencies in Indiana are bound by this gang definition for arrest and charging purposes, however, we have no way of knowing if officers were guided by this definition when checking the gang-related box. Similarly, there was no known formal training on the use of any of the check-boxes.

Overall, incident reports designated as gang-related comprised a minute proportion of police reports for IMPD over the project period (see Table 1). The proportion of cases that were designated gang-related steadily decreases every year from 2015 to 2019. IMPD operated under two different Indianapolis mayors and three different Chiefs of Police during the study period. Differing administrative priorities leads to organizational changes which may be reflected by the decrease of gang-related incident reports (Feeley 1973; Hagan 1999; Lipsky 1980).

Table 1. Annual police incident reports.

Year	Incident Reports		Gang-Related Reports		Percent (of Total)
	n	**%**	**n**	**%**	
2015	127,397	23.3	266	35.9	0.05
2016	128,770	23.6	175	23.6	0.03
2017	124,725	22.8	152	20.5	0.03
2018	119,728	21.9	89	12.0	0.02
2019 *	45,961	8.4	59	8.0	0.01
Total	546,581	100.0	741	100.0	0.14

* Only includes incident reports through 31 May 2019. Source: IMPD Oversight, Audit, and Performance Division.

The majority of data collected from the reports was officer-coded at the time the report was created, for example, incident location, age, race, and gender of any individuals involved, crime type, and/or criminal charges. There is also a free text section called the "Incident Narrative." In this section, the officer provides a summary of the incident. There is no set format for this section and narratives can vary greatly in length and detail. Police incident reports are not created for research (Alison et al. 2001) therefore we recoded fields in an attempt to address our research questions. The following sections discuss the variables used in the analyses as well as information on the coding techniques used for the gang-related reasons variables. See Table 2 for the descriptive statistics for all variables.

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[5]   IC 35-42-2: Battery and Related Offenses.

Table 2. Descriptive statistics for full sample and by dependent variable outcome.

Variable (1 = Yes)	Total n	Total %	Violent Crime n	Violent Crime %	Drug Crime n	Drug Crime %	Other Non-Violent Crime n	Other Non-Violent Crime %	χ^2
Crime Type	741	100	131	17.7	153	20.6	457	61.7	
Named Gang	201	27.1	40	30.5	13	8.5	148	32.4	34.026 ***
Self-Initiated	296	39.9	15	11.5	138	90.2	143	31.3	219.658 ***
Reason									
Gang Signs and Symbols	100	13.5	5	3.8	2	1.3	93	20.4	48.375 ***
Self-identify	61	8.2	17	13.0	1	0.7	43	9.4	16.375 ***
Associates with Gangs	161	21.7	38	29.0	4	2.6	119	26.0	41.944 ***
Law Enforcement Intelligence	227	30.6	11	8.4	109	71.2	107	23.4	160.426 ***
Unknown or Unclear	261	35.2	68	51.9	39	25.5	154	33.7	22.802 ***
Firearm	327	44.4	58	44.3	82	53.6	187	40.9	6.919 *
	M (SD)		M (SD)		M (SD)		M (SD)		F-Statistic
Number of Victims	0.70 (0.86)		1.4 (1.1) [b,c]		0.14 (0.40) [a,c]		0.68 (0.76) [a,b]		94.432 ***
Number of Suspects	1.2 (1.3)		2.1 (1.7) [b,c]		1.0 (1.2) [a]		0.94 (1.2) [a]		38.855 ***

* $p < 0.05$, *** $p < 0.001$; [a] = significant difference from violent crime ($p < 0.05$); [b] = significant difference between drug crime ($p < 0.05$); [c] = significant difference from non-violent crime ($p < 0.05$).

3.1. Dependent Variable

The dependent variable is a categorical measure of crime type (1= violent crime; 2 = drug crime; 3 = other non-violent crime). For each incident report, the reporting officer designates one or more "incident offenses" that specify which state laws have been violated.[6] Each offense designation includes the corresponding Indiana Code.[7] We grouped these into one of three Crime Types (1 = violent crime; 2 = drug crime; 3 = other non-violent crime). In cases where the officer indicated more than one crime type, we coded one crime type in order of severity (violent, drug, other non-violent). 'Violent crimes' included homicide, rape, robbery, aggravated assault, and sex crimes. 'Drug crimes' included possession of paraphernalia, possession, dealing, and cultivation of marijuana, possession or dealing of cocaine, methamphetamine, or other controlled substance, and visiting or maintaining a common nuisance. Any crime that did not fit into one of the first two categories was classified as 'other non-violent crime.' Of the incidents that were labeled as gang-related, the majority were other non-violent crimes followed by drug crimes and violent crimes.

3.2. Explanatory Variables

We used the narrative portion of the incident report to try and determine the reason the reporting officer indicated the incident was gang-related. Gang-related reasons were not determined a priori; we instead used a iterative modified grounded theory approach (Glaser and Strauss 2009) looking for themes to emerge and also with the understanding that each incident report could have more than one reason for being considered gang-related. We finalized on four possible reasons that the incident was gang-related. Each of the following reasons is a binary variable (0 = no; 1 = yes) and gang-related reasons are not mutually exclusive. Incident reports could have more than one reason for being labeled gang-related. Gang Signs and Symbols: The report writer indicted the presence of gang signs and/or symbols which could include gang tattoos, graffiti, and the display of colors and/or signs. Self Identifies: At least one individual listed in the police report self-identifies as a gang member. Associates with Known Gang Members: At least one individual listed in the report associates with or is related to a known gang member. Law Enforcement Intelligence: Law enforcement intelligence would indicate the incident is gang-related. While we may not know the exact intelligence, the nature of the incident including the units or outside agencies involved would indicates the incident is gang-related.

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[6] Incident offenses do not represent prosecutorial charging decisions.
[7] See http://iga.in.gov/legislative/laws/2020/ic/titles/001.

We coded the reason as Unknown or Unclear if we were unable to determine the reason the incident was gang-related. Law enforcement intelligence was the most common reason a report was labeled gang-related—coded in 30% of incident reports (see Table 2). That said, there were a fair number of reports, just more than one-third, for which we were not able to determine why the officer labeled the incident gang-related. At least one reason was identified in 56% of reports. The remaining 10% of reports had two or more reasons identified.

We read each report narrative to determine if the reporting officer recorded a specific gang name (0 = no named gang; 1 = named gang). Just greater than 25% of incident reports included a Named Gang. Report Initiation is the activity that prompted the police report. Report Initiation was categorized according to whether the activity was self-initiated or not (0 = not self-initiated, 1 = self-initiated). Reports that are the result of a 'call for service' (CFS) or reactive police activity can be inherently different than a report that results from self-initiated police activity or proactive activity (Cordner 1979) in that an officer can choose what self-initiated activity to document. Reports that result from a CFS are influenced by the wants or needs of another individual (e.g., a community member) and therefore the officer has less discretion about what is documented in the incident report. Incident reports resulting from a community member's call for assistance (call for service) or from the request of another agency were classified as 'not self-initiated.' In these cases, a police officer in the field was responding to a request for service and therefore has less control over documentation. Responding field officers may not have the same level of working intelligence about the incident as an investigative officer who is working an incident as part of an investigation or self-initiated activity. Self-initiated activity included undercover operations or investigations, search warrant service, person warrant service, and activities where the officer was not dispatched or requested to the location. The majority of police reports (60%) were result of calls for service/not self-initiated.

The number of individual victims and suspects listed in the report were coded as continuous variables. If the only victim listed was an organization and not a specific person, we coded that as zero (i.e., no victim). Fifty-three percent of incidents included at least one victim however the average number of victims per incident was less than one (mean = 0.70, SD = 0.86). More than one-half of incident reports included at least one suspect (65%). The average number of suspects per incident report was just greater than one (mean = 1.2, SD = 1.3). Firearms drive violence in Indianapolis as well as in most urban cities across the United States. We coded 'yes' if the officer listed a firearm in the property section of the report meaning at least one firearm was confiscated or taken into protective custody at the incident scene. About 44% of incidents involved a firearm.

4. Results

The focus of this analysis is two-fold. We are interested in incident characteristics that (1) influence the reporting officer's categorization of that incident as gang-related and (2) differentiate between violent, drug, and other non-violent crimes. Bivariate analyses revealed several differences in crime type across the explanatory variables (see Table 2). In terms of the reasons why these crimes were labeled as gang-related, violent crime incidents were significantly more likely to be labeled as gang-related due to self-identification as a gang member, but it was also more likely that the reason for the gang-related label was unclear. Non-violent crimes were more likely to include the presence of signs and symbols for gang membership. Drug crimes were less likely to involve a named gang and be classified as gang-related because of gang associations. However, drug crimes were significantly more likely to be labeled as gang-related due to law enforcement intelligence. When looking at other characteristics the data show that incidents involving violent crimes were the least likely to result from self-initiated activity, violent crimes were significantly more likely to include multiple victims and offenders, and officers were least likely to confiscate a weapon during other non-violent crime incidents.

Given the established difference in reactive versus proactive self-initiated police activity, it is important to examine these results more closely. Within the non-violent crime incident reports, more than two-thirds of these reports resulted from a call for service (i.e., self-initiated = no). The majority

of incidents categorized as violent crimes resulted from non-self-initiated officer activity, meaning the officer was responding to a call for service from a community member or other law enforcement unit or agency. Only a small proportion of violent crime incident reports resulted from officer-initiated activity. In contrast, the majority (90%) of drug crime incidents were the result of self-initiated officer activity. These differences are significant ($\chi^2 = 219.657$; $p < 0.000$). These findings may suggest several things. First, when gang activity is violent, law enforcement is summoned; it is rare that law enforcement will find violent gang-related activity on their own. Despite this finding, the majority of incidents where officers are responding to a call for service are still non-violent, non-drug related incidents. These data also demonstrate it is uncommon for an incident that was self-initiated by an officer to be a violent incident, that is, gang-related violent incidents almost came to the attention of law enforcement via a third party call for service.

Multivariate Analysis

Given our interest in crime type, we next performed a multinomial logistic regression to determine if we could predict crime type using the explanatory variables. Multinomial regression is appropriate due to the categorical nature of the dependent variable. Table 3 presents the comparison of violent crimes and drug crimes with other non-violent crimes (reference category). The reference category was changed to violent crime (see Table 4) in order to make comparisons between drug and violent crimes.

Table 3. Multinomial logistic regression for violent crime and drug crimes compared with other non-violent crimes.

(n = 741)					[Exp(b)]	95% Confidence Interval	
	Variable	β	SE	Sig	Odds Ratio	Lower	Upper
Dependent	Independent (0 = No)						
Violent Crime	Named Gang	−0.039	0.306	0.898	0.962	0.528	1.752
	Self-Initiated	0.909	0.345	0.008 *	2.483	1.263	4.883
	Firearm	0.496	0.246	0.044	1.642	1.013	2.662
	Number of Victims	0.737	0.147	0.000 ***	2.089	1.565	2.788
	Number of Suspects	0.468	0.078	0.000 ***	1.597	1.37	1.863
	Reason						
	Gang Signs and Symbols	1.372	0.547	0.012 *	3.944	1.351	11.513
	Self-identify	−0.411	0.526	0.434	0.663	0.237	1.857
	Associates with Gangs	−0.332	0.496	0.504	0.718	0.271	1.898
	Law Enforcement Intelligence	0.087	0.599	0.885	1.091	0.337	3.532
	Unknown or Unclear	−0.915	0.569	0.108	0.400	0.131	1.223
Drug Crime	Named Gang	−0.159	0.419	0.704	0.853	0.375	1.937
	Self-Initiated	−1.951	0.331	0.000 ***	0.142	0.074	0.272
	Firearm	0.07	0.235	0.765	1.073	0.677	1.701
	Number of Victims	−0.639	0.258	0.013 *	0.528	0.319	0.875
	Number of Suspects	0.197	0.102	0.054 *	1.218	0.997	1.489
	Reason						
	Gang Signs and Symbols	1.058	0.871	0.225	2.88	0.522	15.889
	Self-identify	1.417	1.192	0.234	4.126	0.399	42.655
	Associates with Gangs	0.875	0.667	0.190	2.399	0.649	8.874
	Law Enforcement Intelligence	−1.445	0.662	0.029	0.236	0.064	0.863
	Unknown or Unclear	−0.627	0.682	0.358	0.534	0.140	2.035

The reference category is Other Non-violent Crime. * $p < 0.05$, *** $p < 0.001$.

The full model fit was significantly improved with the addition of the predictors (χ^2 (20) = 417.606, $p < 0.000$) when compared to the intercept only model. Because we conducted a multinomial regression, we use the odds ratios (ExpB) to examine the effect of the explanatory variables on the dependent variable. We first examine the reasons the report was labeled gang-related. The presence of gang signs and symbols increases the odds of the incident being a violent crime rather than a non-violent crime by 3.9. No other gang-related reasons varied across crime type when controlling for other crime characteristics. The number of victims and suspects documented in the incident report is also important for crime type categorization. As the number of victims in the report increases by one, the odds of the incident being a violent crime versus a non-violent crime increases by 2.1. Conversely, as the number

of victims in the report increases by one, the odds of the report being a drug crime versus a non-violent crime decreases by 0.5. For suspects, as the number of suspects increases by one, the odds that the incident report includes a violent crime versus a non-violent crime increases by 1.6. An increase in the number of suspects increases the odds that the incident report includes a drug crime by 1.2.

Table 4. Multinomial logistic regression for drug crimes compared with violent crimes.

	(*n* = 741)	β	SE	Sig	[Exp(b)] Odds Ratio	95% Confidence Interval Lower	Upper
	Variable	**β**	**SE**	**Sig**	**Odds Ratio**	**Lower**	**Upper**
Dependent	Independent (0 = No)						
Drug Crime	Named Gang	−0.12	0.498	0.809	0.887	0.334	2.353
	Self-Initiated	−2.861	0.443	0.000 ***	0.057	0.024	0.136
	Firearm	−0.426	0.325	0.190	0.653	0.346	1.235
	Number of Victims	−1.375	0.283	0.000 ***	0.253	0.145	0.440
	Number of Suspects	−0.271	0.116	0.020 *	0.763	0.607	0.958
	Reason						
	Gang Signs and Symbols	−0.314	1.016	0.757	0.730	0.100	5.353
	Self-identify	1.829	1.285	0.155	6.226	0.502	77.197
	Associates with Gangs	1.207	0.815	0.139	3.342	0.677	16.513
	Law Enforcement Intelligence	−1.532	0.868	0.078	0.216	0.039	1.184
	Unknown or Unclear	0.289	0.866	0.739	1.334	0.244	7.290

The reference category is Violent Crime. * $p < 0.05$, *** $p < 0.001$.

Next, we explore differences in crime characteristics across violent and drug crimes when compared with non-violent crimes. An officer responding to a call for service (i.e., not self-initiated) decreases the odds of the incident involving a drug crime versus a violent crime by only a small margin (OR = 0.06). Here again, the number of victims and suspects listed in the incident report is important to crime type categorization. As the number of victims in the report increases by one, the odds of the report being a drug crime versus a violent crime decreases by 0.2. For suspects, as the number of suspects increases by one, the odds that the incident report includes a drug crime versus a violent crime decreases by 0.8.

5. Discussion

Gang members participate in more than their fair share of violent offending but are also involved in other less serious criminal activities. This statement is supported by both qualitative and quantitative research but has not been adequately explored through official records such as police incident reports. Rather, prior work drawing on law enforcement data sources focuses heavily upon violent crime, in particularly gang homicide. This gap in the literature may be due to law enforcement definitions of gangs, gang members, and crimes that limit the range of offenses that are labeled gang-related. Given that news media and policy makers rely upon law enforcement perceptions of these activities, a focus on violence can lead to the misperception that gangs and gang members are *only* involved in violent criminal behavior. This misperception can result in moral panic and the creation of highly punitive policies targeted at gang members (e.g., gang enhancements and injunctions) Moreover, the belief, whether accurate or not, that gangs drive urban violence can influence whether or not a law enforcement agency maintains a gang unit despite the actual existence of documented gang violence (Katz 2001). In this manuscript, we examined four years and five months worth, of violent, drug, and non-violent gang related incidents from IMPD to determine why they were labeled as gang-related as well as what characteristics differentiate incident types.

During these years, very few incident reports were labeled as gang-related and even fewer were considered violent incidents. In fact, non-violent crimes made up the bulk of the gang-related incidents, followed by drug and then violent crimes. These findings indicate that IMPD officers are not simply choosing violent incidents to label as gang-related. Similarly, less than 50% of the incidents labeled gang-related involved an officer confiscating a gun and the majority of those incidents were categorized as non-violent. Only 60% of gang-related incident reports were the result of reactive police activity; the remaining incident reports were the result of proactive police activity and were overwhelmingly non-violent in nature.

Our work revealed that law enforcement intelligence is the primary reason incident reports were labeled gang-related but beyond that, it was common for the reporting officer to not articulate a reason, especially if the incident involved a violent crime. However, after controlling for other characteristics of the incident, officers were more likely to document the presence of gang signs or symbols for violent crime incidents than for non-violent crimes. This finding is consistent with prior literature that indicates that officers rely upon the presence of gang signs and symbols when identifying gang members (Densley and Pyrooz 2020; Scott 2020). Violent crimes were also distinguishable from drug and non-violent crimes by the presence of multiple co-offenders/suspects as well as the presence of multiple victims—a finding which is also consistent with prior research (Pyrooz et al. 2011). Our results also indicate that violent crime incidents were more likely to be brought to attention of the police through a call for service. This finding suggests that when gang activity is violent, law enforcement is called; it is rare that law enforcement will find violent gang-related activity during routine patrol or other unit specific activity.

Our findings indicate that drug crimes were likely to be labeled as gang-related due to law enforcement intelligence and that they were likely to be self-initiated by officer. This finding is most likely indicative of the routine activity of specialty units whose missions are highly focused and driven by unit assignment. That is, we can make the assumption, for example, that the activity of the gang unit is associated with gang-related crime without knowing the exact reason for the relationship.

While these findings contribute to the criminological literature on gangs and policing, there are several limitations. First, police incident reports are not created for research which, therefore, limited what variables we were able to code, how they were coded, as well as the analyses we were able to conduct. For example, the reporting officer knows why he or she considered the incident gang-related and our interpretation may or may not align with the reporting officer's creating threats to internal validity. We were also unable to determine a reason the incident was labeled gang-related for 35% of the sample. Police incident reports are public record and law enforcement agencies must provide access to these reports upon request (see Indiana Code 5-14-3). Investigatory records are excluded from disclosure rules and, therefore, this type of information—which would provide more detail as to why an incident is gang-related—is usually not found in police incident reports. We encourage future researchers to engage with reporting officers to gather their perceptions on why incidents were labeled as gang-related.

Second, we focus on one Midwestern, American law enforcement agency. Police incident reports and how they are written are influenced by myriad factors that vary across time and space. The reports used in this work are limited to information gathered by the reporting officer at the time of the incident. While informative, these findings are only generalizable to Indianapolis during the study period. We encourage similar work in other jurisdictions, states, and countries in order to build the knowledge-base and allow for comparisons. Third, incidents were identified as gang-related through the reporting officer's use of "check-boxes" while filling out the incident report. We were not able to determine what, if any, training officers received regarding when to check and when not to check the box. There also may be error associated with officers who checked the boxes in error or unintentionally. Moreover, the identification and labeling of the gang-related reasons was based on a thematic analysis of the incident reports, not the officer's perception of why he or she labeled an incident gang-related. Future research would benefit from a more in-depth analysis of officers' perceptions of these incidents. Finally, we were unable to differentiate between violent acts that serve a functional or expressive role in gang crime, (see Andell 2020 as well as Decker and Pyrooz 2015). Other research should compare police incidents for different forms of violence.

Despite these limitations, our findings provide insight into gang incident reports and have implications for gang research using official police records. While it is difficult to know exactly why officers consider some incidents gang-related and others not, our findings indicate that the majority (62%) of gang-related incident reports involve non-violent crimes. This finding is important for policy

makers and local agencies working with gang members in that it demonstrates programming should address more than just violence.

6. Conclusions

While modest, these results are novel and have implications for research as well as policy. Our research supports the idea that official records of gang-related crimes or gangs may not be generalizable across cities, see (Maxson and Klein 1990) and, as our data indicate, may be dependent on the type of law enforcement activity. The presence of a gang unit at the local level and/or other state and federal units that focus on gang violence (e.g., Violent Gang Safe Streets Task Force)[8] influences related law enforcement activity. More specifically, it influences self-initiated officer activity. Documenting gang-related crimes is important for prevention, intervention, and suppression; therefore, it is imperative that there are "best practices" for documenting these types of crime. Consistent measurement of gang crimes across jurisdictions can only result in improved knowledge and better policy.

The results show that despite an urban setting and frequent violent crime, very few incidents are labeled as gang-related by law enforcement and that the prevalence is decreasing yearly. This fact could be as a result of a movement away from a specialized gang unit as well as a deprioritization of gang crime in Indianapolis. IMPD's new records management system and coinciding removal of the gang-related check box from incident reports may also indicate less emphasis on gang violence and more emphasis on violence in general. The elimination of the gang-related label means that it may be difficult for prosecutors to identify opportunities to use and apply Indiana gang enhancement code as well as charge individuals with participating in criminal gang activity. In fact, these statutes are invoked very infrequently in Indianapolis. We found only two instances of this charge (see Indiana Code 35-45-9-3) in our entire multi-year sample of gang-related police incident reports and other research indicates that gang enhancements are used infrequently in Indiana, especially in Marion County where Indianapolis is located (Hall 2019). Additionally, a movement away from a focus on gangs can result in a lack of guidance on how to work with and address gangs (Andell 2019) for a discussion of this issue in the context of the United Kingdom).

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[8] https://www.fbi.gov/investigate/violent-crime/gangs/violent-gang-task-forces.

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Article

East Side Story: Disaggregating Gang Homicides in East Los Angeles

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Abstract: This research extends the homicide literature by using latent class analysis methods to examine the neighborhood structural and demographic characteristics of different categories of homicides in the Hollenbeck Community Policing Area of the Los Angeles Police Department (LAPD). The Hollenbeck area itself is a 15 square-mile region with approximately 187,000 residents, the majority of whom are Latino (84 percent). Hollenbeck also has a protracted history of intergenerational Latinx gangs with local neighborhood residents viewing them as a fundamental social problem. Hollenbeck has over 30 active street gangs, each claiming a geographically defined territory, many of which have remained stable during the study period. Over twenty years (1990–2012) of homicide data collected from Hollenbeck's Homicide Division are utilized to create an empirically rigorous typology of homicide incidents and to test whether or not gang homicides are sufficiently distinct in nature to be a unique category in the latent class analysis.

Keywords: homicide; homicide types; disaggregation; street gangs; latent class analysis

1. Introduction

Prior to the Covid-19 Pandemic, which disrupted crime trends (Campedelli et al. 2020; Mohler et al. 2020; Rosenfeld and Lopez 2020), homicide rates across many jurisdictions were at some of the lowest levels on record, yet this has not lessened policymakers and police agencies' desire to further reduce the number of homicides within a given jurisdiction. Despite these overall reductions in violence, gang prevalence continues to be a widespread phenomenon throughout the United States, as witnessed by an increase of over 20 percent in the number of jurisdictions reporting gang problems to the National Gang Youth Survey between 2002 and 2009 (Howell et al. 2011). In fact, approximately 85 percent of gang-related homicides in the United States occur in large cities, populations over 100,000, or in proximate suburban counties (NGC 2017). Howell and Griffiths (2018) investigated this trend by examining gang-related homicides from 1996 to 2012 in 248 large cities. Their findings indicate that in the majority of sampled cities (65.3%), gang-related homicides contribute annually between 30 and 40 percent of all homicides (Howell and Griffiths 2018). Valasik and colleagues (Valasik et al. 2017) have also shown that in disadvantaged communities gang-related homicide remains stubbornly affixed over decades. In contrast, non-gang homicide appears to be more responsive to interventions. Overall, "street gang research has regularly shown a strong, positive relationship between gangs and violence, existing across places and over time" (Valasik and Reid 2020, p. 273).

From a legislative standpoint, the criminal justice system makes a concerted effort to designate a criminal offense as gang-related[1] if that criminal offense involves an individual who is associated with a gang. The NGC (2017) has identified forty-four states and Washington D.C. as having legislation that explicitly defines a gang. The overall majority of these states have also enacted some form of anti-gang legislation that allows for enhancements to be added on to an accused gang member's principal crime (Anderson et al. 2009; Bjerregaard 2003, 2015; Geis 2002). For instance, the use of wide-reaching gang enhancement laws known as STEP Acts, an acronym for Street Terrorism Enforcement and Prevention, permit the felony prosecution of individuals who associate with a criminal gang, assist gang members with their criminal actions, or just have prior knowledge of a gang member's engagement in criminal activity (Bjerregaard 2003, 2015; Geis 2002; Klein and Maxson 2006). For instance, California's STEP Act, penal code 186.22PC, mandates that any gang member committing a felony (e.g., murder) will receive an additional prison sentence consecutive to the penalty received for the original crime. In the case of a murder conviction the STEP Act's gang enhancement would result in an additional 15 years added to an individual's sentence. Prosecutors are then encouraged to aggressively seek justice, which usually entails pursuing an enhancement for any gang-related homicide regardless of the motivation driving the crime (Anderson et al. 2009; Rios 2011). As such, gang-related homicides are frequently considered to be a distinct type of homicide different from other forms of lethal violence. That is, homicides involving gang members are treated as something inherently distinct, from investigating (Katz and Webb 2006; Klein 2004; Leovy 2015; Valasik et al. 2016) to prosecuting (Anderson et al. 2009; Capizzi et al. 1995; Caudill et al. 2017; Pyrooz et al. 2011) to sentencing (Anderson et al. 2009; McCorkle and Miethe 1998; Miethe and McCorkle 1997). But what are the characteristics that make a gang-related homicide so different from a non-gang homicide?

Prior research has disaggregated gang-related homicides from non-gang homicides to answer this question, finding that a variety of micro-, meso-, and macrolevel characteristics impact acts of gang-related violence differently than acts of non-gang violence (Bailey and Unnithan 1994; Barton et al. 2020; Brantingham et al. 2020; Curry and Spergel 1988; Decker and Curry 2002; Egley 2012; Mares 2010; Maxson 1999; Maxson et al. 1985; Maxson and Klein 1990, 1996; Pizarro and McGloin 2006; Pyrooz 2012; Rosenfeld et al. 1999; Smith 2014; Valasik et al. 2017). Despite the robust knowledge gained over the years from these studies, they overlook one crucial element. These prior studies infer in their analyses a level of homogeneity among gang-related homicides. That is, they treat all gang-related homicides as being indistinguishable from one another. Yet, the variation in motivations prompting gang members to participate in violence is wide-ranging, from retaliation against a rival, to being a consequence of another criminal act (e.g., drug sales, robbery), to arising from a domestic dispute. Important nuance exists in gang-related homicides that is being lost in the straightforward analyses of prior research. As such, more meaningful disaggregation must be examined to ascertain just how much variation exists within gang-related homicides and acknowledging the complex nature of gang-related violence.

The current paper addresses this gap in the literature by using the variation in the circumstances, motive, setting, participant characteristics, and rivalry relationship present in gang-related homicides to explore the diversity of gang-related homicides. Latent class analysis (LCA) is utilized to look for hidden "classes" in data that are mutually exclusive to each other. The goal of this study is to systematically disaggregate gang-related homicides in a measured process and assess how the latent classes of gang-related homicides vary from each other. The broader study objective, however, is to highlight that a more nuanced

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[1] Gang-related homicides, sometimes referred to as gang-affiliated or member-based gang homicides, are those events in which at least one gang member is a participant (see Maxson and Klein 1990, 1996). Gang-motivated homicides are a subsample of gang-related events that result directly from "gang behavior or relationships" and are prompted by some group incentive (e.g., reputation/status, revenge, initiation, etc.) (Rosenfeld et al. 1999, p. 500). More discussion on the current study's use of the more inclusive measure, gang-related homicides, is detailed below in the data section.

understanding of gang-related homicide is required if interventions aimed at reducing gang-related homicide are going to be implemented successfully (e.g., focused deterrence, civil gang injunctions, etc.). The remainder of the paper begins with discussing the use of homicide disaggregation in gang studies to highlight the disparities between gang-related and non-gang violence. The prevalent theories guiding this disaggregation process are highlighted along with persistent covariates that remain significant across the extant literature. The unique dataset created out of homicide case files from the Homicide Unit of the Los Angeles Police Department's (LAPD) Hollenbeck Community Policing Area and the LCA used in the current study are then discussed. Results are presented. A discussion about the benefits and applications of disaggregating gang-related homicides concludes the paper.

2. Background

2.1. Homicide Disaggregation and Gang Research

Land and colleagues (Land et al. 1990) indicate that homicide research needs to better investigate whether the associations between a study's community covariates (i.e., population structure, deprivation, and percent divorced) and aggregated homicides are generalizable to disaggregated types of homicide. Scholars have generally taken this to mean that studies should examine if these covariates are similarly or differently associated with distinct types of homicide (e.g., gang, drug, domestic, etc.) (see Corsaro et al. 2017; Kubrin and Wadsworth 2003; Pizarro 2008; Tita and Griffiths 2005). Furthermore, Williams and Flewelling (1988, p. 422) contend that homicide disaggregation "should be guided by the theoretical focus of the research problem" and "into meaningful subtypes of homicide." Homicide disaggregation, as Kubrin (2003) points out, is a valuable tool to better understand how a neighborhood's social structure relates to different types of homicide and their frequency.

Much of the research on gang-related violence disaggregates the incidents into gang and non-gang homicides (Bailey and Unnithan 1994; Barton et al. 2020; Brantingham et al. 2020; Curry and Spergel 1988; Decker and Curry 2002; Egley 2012; Mares 2010; Maxson 1999; Maxson et al. 1985; Maxson and Klein 1990, 1996; Pizarro and McGloin 2006; Pyrooz 2012; Smith 2014; Valasik et al. 2017), or even disaggregating into gang-motivated, gang-affiliated, and non-gang homicides[2] (Rosenfeld et al. 1999) to examine micro-level differences between these homicide subtypes. The results from these studies have been remarkably consistent over time and place. Overall, these comparative studies have highlighted how the characteristics of the participants, the setting/context, and the neighborhood structure/environment are able to differentiate gang-related violence from non-gang acts. The reason for pushing for gang homicides to be disaggregated similar to broader homicides is that by grouping all gang homicides together, there is a limit to our understanding of how multidimensional gang homicides can be. As Kubrin (2003) notes, researchers need to expand on how a range of covariates are associated with different types of homicides and to understand how invariances seen in broader homicide studies apply to gang homicides.

2.2. Covariates of Gang Homicide: Prior Research and Ongoing Conceptual Issues

For over the last three decades there have been two consistent theoretical approaches used to advance our understandings of gang-related homicide, the role of collective behavior (Decker 1996; Klein and Maxson 1989) or the influence of a community's context, principally through the lens of social disorganization theory (Bursik and Grasmick 1993; Sampson and Groves 1989; Shaw and McKay 1942). The former, the role of collective behavior argues that dynamic social processes (e.g., retaliation) are what drive the rates of gang-related homicide (see Bichler et al. 2019; Brantingham et al. 2012, 2019; Brantingham

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[2]   In the latter case, Rosenfeld and colleagues (Rosenfeld et al. 1999) categorized a homicide as non-gang when the participants involved were not associated with a gang and the event was not the result of any known gang activity.

et al. 2020; Decker 1996; Klein and Maxson 1989; Lewis and Papachristos 2020; Nakamura et al. 2020; Papachristos 2009; Papachristos et al. 2013; Pizarro and McGloin 2006). The latter, the community context of gang-related homicide suggests that a neighborhood's social structure and correlates, including aspects of community social control, influence the ebbs and flows of gang-related violence (see Barton et al. 2020; Curry and Spergel 1988; Kubrin and Wadsworth 2003; Mares 2010; Papachristos and Kirk 2006; Pizarro and McGloin 2006; Pyrooz 2012; Radil et al. 2010; Smith 2014; Valasik 2018; Valasik and Tita 2018; Valasik et al. 2017).

Decker (1996) contends that gang-related violence, particularly sharp upticks in homicides, are driven by the role of collective behavior. Building from Short and Strodbeck's (1965) work, that gangs are more than the sum of their individual members but the notion that group processes heavily influence that activities, Decker (1996, p. 244) stresses that the function of threat, perceived or actual, "plays a role in the origin and growth of gangs, their daily activities, and their belief systems." Klein and Maxson (1989, p. 203) suggest that violent activities can serve both a social and psychological function amongst a gang's membership, which "may contribute to violence escalation" observed in street gangs. On the basis of this point of view, the retaliatory nature of gang-related homicide can be thought of as a series of "escalating" encounters of violence between gangs, catalyzed by an initial act of violence. As Brantingham and colleagues (Brantingham et al. 2020, p. 14) astutely surmise, "group-level processes amplify the dynamics of gang-related violence." Such patterns have been regularly observed in the existing gang literature (see Brantingham et al. 2019, 2020; Lewis and Papachristos 2020; Nakamura et al. 2020; Papachristos et al. 2013; Tita et al. 2003).

To better unpack the group dynamics that make gang-related violence unique, studies have evaluated the incident and participant characteristics of gang-related homicides compared to acts of violence that do not involve gang members. Prior research examining the incident characteristics of a gang-related homicides consistently finds that these acts of violence involve a firearm; consist of multiple shots being fired at the victim; transpire outside, in public, on the street; include multiple offenders and victims; and are prompted by gang-related motivations (e.g., retaliation, defending turf, intra-gang conflict, etc.) and statistically less likely to be driven by disputes that are domestic/romantic in nature, and are more likely to involve a mobile offender seeking out the victim (Klein et al. 1991; Maxson 1999; Maxson et al. 1985; Maxson and Klein 1990, 1996; Curry and Spergel 1988; Rosenfeld et al. 1999; Decker and Curry 2002; Pizarro and McGloin 2006; Tita and Griffiths 2005; Valasik 2014). When compared to non-gang violence, studies analyzing the characteristics of the participants, offenders and victims, involved in a gang-related homicide are statistically more likely to be a person of color (i.e., Latinx or Black); be male; be younger in age; participants lack a clear relationship with each other (e.g., strangers); and participants have a prior criminal history (Klein et al. 1991; Maxson 1999; Maxson et al. 1985; Maxson and Klein 1990, 1996; Curry and Spergel 1988; Rosenfeld et al. 1999; Decker and Curry 2002; Pizarro and McGloin 2006; Tita and Griffiths 2005; Valasik 2014). The existing research has reliably shown that both the characteristics of the incident and the participants are "clearly related to the *group* nature of" gang-related homicides making them distinct from non-gang homicides (Maxson et al. 1985, p. 220).

Guided by the social disorganization framework, the community context of gang-related homicide stresses that the spatial concentration of neighborhood-level characteristics are better able to account for the patterns in gang-related homicide (Bursik and Grasmick 1993; Curry and Spergel 1988; Rosenfeld et al. 1999). That is, the social structure and/or built environment of a neighborhood directly influences the trends in the violent acts of gang members (see Barton et al. 2020; Pyrooz 2012; Smith 2014; Valasik 2018; Valasik et al. 2017). Influenced by Short and Strodbeck's (1965) research highlighting the ecologically distinctness of gang homicides, being a localized community problem that adheres to classical theories of poverty, Curry and Spergel (1988) explicitly operationalized the framework of social disorganization to examine both gang-related delinquency and

homicide. Specifically, Curry and Spergel (1988) hypothesized that neighborhoods with residential instability will likely have weak social controls, making these communities more susceptible to gang violence. Conversely, they suspected that delinquency and crime perpetrated by gang members would be more likely to transpire in neighborhoods that are economically deprived (Curry and Spergel 1988). Using two different time periods to analyze the patterns of gang homicide, Curry and Spergel (1988) found that gang-related homicides are spatially concentrated in communities besieged with poverty and population churning, suggesting that social disorganization may be an important influence contributing to the prevalence of gangs and their associated acts of violence. Expanding on how a neighborhood's structural conditions influence gang-related violence, Rosenfeld and colleagues (Rosenfeld et al. 1999) compared and contrasted gang-motivated, gang-affiliated, and non-gang homicides in St. Louis. Consistent with Curry and Spergel (1988), Rosenfeld et al. (1999) find that all three homicide types are concentrated in unstable, disadvantaged neighborhoods that are racially isolated. Gang-motivated homicides were in fact more likely to occur in racially segregated communities, and non-gang homicides were more associated with disadvantaged neighborhoods, suggesting that a neighborhood's racial composition has a greater impact on the prevalence of gang homicides than socioeconomic disadvantage. Additionally, Rosenfeld and colleagues (Rosenfeld et al. 1999) revealed that gang-affiliated homicides were more likely to resemble non-gang violence than gang-motivated violence.

Further contributing to the limited research on the neighborhood-level correlates of gang homicide, Pyrooz (2012) investigated the relationship between gang-related homicide and the structural covariates of a neighborhood (e.g., resource deprivation, residential stability, racial composition, etc.) at the macro-level. Pyrooz (2012) finds that both population density and socioeconomic deprivation impact gang-related homicides across America's 88 largest cities (smallest city had 200,000 residents). A drawback to Pyrooz's (2012) study is that such a broad macro-level analysis can conceal "sub-area and neighborhood cycles that cancel each other out in the aggregate" (Klein 1995, p. 223). More recently, Valasik and colleagues (Valasik et al. 2017) addressed this issue by conducting a meso-level analysis, examining longitudinal trends in gang homicide over a 35-year period in an area of East Los Angeles. Valasik et al.'s (2017) findings reveal that gang-related homicides remain spatially clustered and over-represented in socioeconomically disadvantaged neighborhoods, suggesting that intergenerational gangs and features of the neighborhood are able to exert substantial influence on sustaining gang-related violence over the long term (see also Barton et al. 2020). In fact, Brantingham and colleagues (Brantingham et al. 2020, p. 16) point out that the majority of gang-related violence is not a "contagious offspring event" (i.e., retaliation) but instead suggest that "structural environmental conditions" have a greater influence on gang-related violence than the role of collective behavior.

3. Current Study

Disaggregating homicides between gang and non-gang incidents has produced a more nuanced understanding of the micro-, meso-, and macro-level characteristics that influence these acts of gang-related violence; however, this approach still assumes homogeneity within gang-related homicides. For instance, the motivations that drive gang members to engage in such criminal events can vary widely, from an escalated domestic dispute, to a being the byproduct of a criminal act (e.g., robbery, drug sales). The current study uses homicide case files from the Homicide Unit of LAPD's Hollenbeck Community Policing Area to examine if distinct classes of gang-related homicide actually exist. Utilizing a latent class analysis (LCA), an underutilized, yet worthwhile semiparametric technique, attempts to ascertain if hidden groups are present in data. This approach allows for the creation of groups of "classes" that are mutually exclusive where observations (i.e., homicides) that are similar to each other will be placed in the same class while observations that differ are placed in separate classes (Collins and Lanza 2010; Eggleston et al. 2004; Oberski 2016; Vaughn et al. 2009). This study's goal is addressing the oversight of traditional examina-

tions of gang-related violence by acknowledging that variation exists in the circumstances, motive, setting, participant characteristics, and rivalry relationship in gang-related homicides and assess in a systematic manner if different types of gang-related homicide are present. By ascertaining how the latent classes of gang-related homicides differ will allow for more appropriate interventions to be developed and applied to address gang-related violence.

4. Methods

4.1. Data

The data include all 844 known gang-related homicides from 1978 through 2012. The data were manually gathered from the individual homicide case files maintained at LAPD's Hollenbeck Community Policing Area (Barton et al. 2020; Brantingham et al. 2012, 2019; Tita and Radil 2011; Valasik 2018; Valasik et al. 2017). The data include both open and closed cases and contain a copious number of potential variables related to the participants involved (e.g., age, gender, gang affiliation, residence, etc.) and the characteristics of the incident (e.g., weapon, participants relationship, motivation, weapon used, etc.). Additionally, the data include the street address of a homicide's location. Griffiths and Tita (2009, p. 480) point out that concerns about using official police data exist (i.e., reporting, recording, etc.); however, "homicide is known to suffer from fewer of these limitations than other offenses, is most likely to come to the attention of the police, and is the least biased source of official crime data available" (see also Decker and Pyrooz 2010; Katz et al. 2000). Directly culling the data from homicide detective's case files allowed for gang-related events to be coded as either member- or motive-based offenses[3]. For a homicide to be labeled gang-related under a motive-based definition requires the incident to be a direct function of gang activity (e.g., recruitment, retaliation, territoriality, etc.). In contrast, a member-based definition is a broader designation that includes any homicide in which any participant, suspect(s) or victim, is affiliated with a gang. As such, the member-based designation is more inclusive by capturing homicides that may be the result of an individual member's sole motivation, "after all, gang members can and do act of their own accord" (Papachristos 2009, p. 86). Conversely, a motive-based definition errs by "sampling too heavily on the dependent variable by capturing only those cases in which a group motive was determined" (Papachristos 2009, p. 86). Motive-based gang homicides are a subsample of member-based designated incidents, and artificially restricting a data sample could discard potentially valuable information (Pyrooz 2012). Regardless of whether a member- or a motive-definition is used to designate a gang homicide, Maxson and Klein (1996, p. 10) attest that for "all intents and purposes identical" results are produced with the same variables being able to statistically differentiate a non-gang homicide from gang homicide. Even though the definition of a "gang" homicide remains unsettled in the literature (see Maxson and Klein 1990, 1996), the current study employs the more inclusive member-based definition.

4.2. Research Site

A 15.2 square mile region, the Hollenbeck Community Policing Area, is just east of the Los Angeles River and the downtown metro area. Over the current study's time period there have been approximately 170,000 residents living throughout Hollenbeck's eight communities: Boyle Heights, El Sereno, Hermon, Hillside Village, Lincoln Heights, Montecito Heights, Monterey Hills, and University Hills (Valasik et al. 2017). The area is over 80 percent Latino and remains a disadvantaged portion of the city with over 25 percent of residents living below the poverty line (Minnesota Population Center 2011). Intergenerational gangs have a protracted history in Hollenbeck, and while the number of

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3 The LAPD traditionally utilizes a member-based definition to demarcate gang-related homicides. The current Department Manual (Line Procedures 4/269.10) states that "any crime may constitute a gang-related crime when the suspect or victim is an active or affiliate gang member, or when circumstances indicate that the crime is consistent with gang activity." A near identical definition is reported by Maxson and Klein (1990) for how LAPD designated such crimes in 1980, supporting the consistent reporting practices by the department during the current study's time window.

active street gangs has varied, since the late 1990s there has been approximately 30 active street gangs, each claiming a geographically demarcated territory (see Barton et al. 2020; Brantingham et al. 2012, 2019; Moore 1991; Tita et al. 2003; Valasik 2018; Valasik et al. 2017; Vigil 2007). The quasi-institutional nature of Hollenbeck's gangs has anchored them to particular barrios (i.e., neighborhoods) greatly restricting the presence and activity patterns of gang members in four of Hollenbeck's communities (i.e., Hermon, Monterey Hills, Hillside Village, and University Hills) (Valasik et al. 2017). While not impenetrable, Hollenbeck's jurisdictional boundaries greatly inhibit the local communities from the adjacent neighborhoods' activities. Tita and colleagues (Tita et al. 2003; Tita and Radil 2011) further indicate that the both the political boundaries along with the built and natural environments buffer Hollenbeck's gangs from interactions with outside groups in proximate areas while also producing a setting in which gang rivalries in Hollenbeck are self-contained, creating a natural field site.

4.3. Latent Class Analysis

The current study utilizes an analysis plan that is aimed at uncovering patterns in gang-related homicides. Since this project is aimed at uncovering whether or not gang-related homicides group together by specific characteristics, the most appropriate technique is a Latent Class Analysis (LCA). LCA is a measurement model in which cases can be classified into mutually exclusive and exhaustive types, or latent classes, based on their pattern of answers on a set of categorical indicator variables. The LCA was conducted using the Mplus software package (Muthén and Muthén 2012). The Mplus software package allows for the statistical control of nonnormality and outliers through the use of robust maximum likelihood estimation (Curran et al. 1996). In order to conduct tests of model fit, the first step is to estimate the mixture model based on the latent profile indicators with an increasing number of classes. LCA model fit was compared using log-likelihood, Akaike information criteria (AIC), Bayes information criteria (BIC), and entropy, as is recommended in evaluating these kinds of models (Grant et al. 2006). Smaller values of log-likelihood, AIC, and BIC indicate better fit to the data or increased probability of replication, and higher values of entropy reflect better distinctions between groups (Kline 2015). Since some evidence suggests that the BIC performs best of the information criterion indices (Nylund et al. 2007), this index was prioritized in interpreting the current data.

4.4. Measures

The manual collection of the highly detailed data from individual homicide case files allowed for a multitude of participant- and incident-level characteristics to be coded and used in the subsequent analyses. The selection of variables was guided by the larger literature on disaggregating homicides and key elements of gang-related violence (see Klein and Maxson 2006; Kubrin 2003; Kubrin and Wadsworth 2003; Pizarro 2008; Skott 2019; Tita and Griffiths 2005). All of the data culled from the individual case files were collected and coded by a sole researcher. All of the personal identifiers (e.g., name, birthdate, etc.) in the dataset were anonymized. Each measure used in the current study and the rationale for how that measure was created and coded in the data is discussed below in the related subsections (i.e., participant- or incident-level). Descriptive statistics for the measures are listed in Table 1 below.

Table 1. Descriptive statistics for gang-related homicides, 1978–2012 (*N* = 844).

Characteristic	Obs	Percent
Participant-level		
Victim age range		
11–14	11	1.97%
15–18	110	19.75%
18–21	244	43.81%
22–25	123	22.08%
26–30	67	12.03%
30+	2	0.36%
Motivation		
Crime	34	4.03%
Drug	74	8.77%
Gang	409	48.46%
Dispute	209	24.76%
Domestic	28	3.32%
Other	90	10.66%
Victim/Suspect Relationship		
Stranger	195	23.10%
Non-stranger	649	76.90%
Gang Relationship		
Rival	335	39.69%
Non-rival	113	13.39%
Intra-gang	69	8.18%
None	219	26.05%
Unknown	108	12.80%
Incident-level		
Location		
Street	567	67.90%
Inside a structure	104	12.46%
Outside a structure	731	87.54%
Public Housing Community	130	15.40%
Gang Turf	731	86.61%
Multiple victims	57	6.75%
Drive-By shooting	241	28.55%
Time of Day		
Overnight	369	43.72%
Work Hours	180	21.33%
Early Evening	295	34.95%

4.4.1. Participant-Level Characteristics

Age of the victim is included and was organized into six age categories to capture crime-prone age ranges[4]. Race/ethnicity and gender were not included in the analysis as Hollenbeck's population is overwhelmingly Latinx (over 80 percent), including the local intergenerational gangs. The lack of variation in gang violence, being concentrated among Latino males, 96.0% of victims and 99.1% of suspects, prohibited the inclusion of these variables as it substantially reduced the statistical power of the subsequent analyses. Prior research (Griffiths and Tita 2009; Tita and Griffiths 2005) guided the creation of five mutually exclusive dichotomous variables to capture the suspect's primary motivation for the violent act: gang, criminal, drug, dispute, domestic/romantic, and other. A homicide was only coded as gang-motivated if the incident involved initiation practices, territorial disputes, targeted attacks, inter-gang rivalries or feuds, or planned retaliations. That is, homicides were only coded as gang-motivated if it was a decisive act that contributed to that gang member maintaining his status in the group. Otherwise, a homicide was coded based upon

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[4] Due to missing data for the suspect (e.g., unknown individual), only the victim's age was included in the analysis.

the participating gang member's primary motive (e.g., dispute, domestic/romantic, etc.). Any incident that was drug-related or substance-induced was coded as drug; the majority of these incidents (74.3 percent) were centered around drug dealing, arguments between participants, or dealer stickups. Likewise, homicides that resulted from a nondrug-related crime (e.g., burglary, robbery, etc.) were coded as criminal. Homicides that involved domestic disputes or romantic love interests (e.g., love triangles) were grouped together and coded as domestic/romantic. Generally, these events involve family members or intimates and tend to have a much different character than the other motive categories. A dispute involves any type of argument or fight that escalates into a murder. Generally, these are spontaneous actions or stem from an existing feud specifically between the participants involved in the homicide and are not driven or planned out by the members' respective gangs. These events include physical altercations that evolve into lethal violence, the redressing of an ad hominem insult or self-defense. The final category, other, includes homicides that were accidental, business-related (nondrug-related), facilitated by mental illness, or unknown.

The relationship between the participants, suspect and victim, is a dichotomous variable indicating if they were strangers (1 = yes and 0 = no) or if they were non-strangers (i.e., family members, friends, acquaintances). As Tita and Griffiths (2005, p. 283) argue, "those who kill within the realm of gang motivated incidents or drug-market activities "know" their victims, maybe not on a personal level but at least on an organizational/status level." To further tease apart the relationship between the participants involved in a gang-related homicide, the gang affiliation of the suspect and victim was compared to establish four mutually exclusive dichotomous variables. This categorization process is only possible due to the robust investigation of Hollenbeck's gangs over the course of three decades has provided a rich history documenting the enduring, intergenerational feuds between gangs in the community policing area (see Brantingham et al. 2012, 2019; Fremon 2008; Moore 1978, 1991; Tita et al. 2003; Tita and Radil 2011; Valasik 2014, 2018; Vigil 1988, 2007). Beyond the detailed academic sources, detailed gang intelligence maintained by Gang Impact Team (GIT) officers and gang detectives were also used in establishing this metric (see Valasik et al. 2016). Rival (1 = yes and 0 = no) indicates that both of the participants involved in a homicide were members of gangs that have an active rivalry with ongoing hostilities. Events that involved participants from separate gangs without ongoing hostilities are designated as non-rival (1 = yes and 0 = no). A homicide occurring where both the victim and suspect were affiliated with the same gang is considered to be an *intra-gang* (1 = yes and 0 = no) event. The final category, none (1 = yes and 0 = no) involves one participant, either suspect or victim, who was not affiliated with any known gang at the time of the homicide.

4.4.2. Incident-Level Characteristics

Prior research (Corsaro et al. 2017; Tita and Griffiths 2005) indicates that the location of where a homicide occurs will differ between various types of homicides. Given gang-related violence to transpire on the street, a variable was created to specifically capture this phenomenon (1 = yes and 0 = no). Further, differentiating where a homicide takes place, incidents are outside in open, public areas or inside a building or structure (1 = inside and 0 = outside). Gang turf (1 = yes and 0 = no) indicates if a homicide occurred within one of the participant's gang's claimed territory or outside of those boundaries. Again, the robust gang scholarship by Hollenbeck and gang intelligence allowed for this metric to be created (see Brantingham et al. 2012, 2019; Radil et al. 2010; Tita et al. 2003; Valasik 2014). Prior research (Griffiths and Tita 2009; Holloway and McNulty 2003; Popkin et al. 2000; Venkatesh 1997; Vigil 2007; Weatherburn et al. 1999) has also suggested that public housing communities experience dramatically higher levels of gang-related violence. Griffiths and Tita (2009, p. 480) find that they are in fact "hotbeds of violence" where the participants involved are more likely to local residents. Therefore, public housing (1 = yes and 0 = no) is a measure specifically accounting for the influence of these disadvantaged areas by designating if a homicide transpired within a public housing complex. It should be noted

that all of the public housing communities within Hollenbeck have a well-documented history of entrenched gang activity and violence (see Barton et al. 2020; Fremon 2008; Vigil 2007).

The literature on gang violence indicates that gang-related incidents are also more likely to involve multiple victims (Maxson et al. 1985; Maxson and Klein 1990, 1996). A dichotomous variable was used to capture this difference (1 = multiple individuals and 0 = a singular individual). Gang research has also indicated that gangs routinely employ the drive-by as a technique to attack rival gangs (Bolden 2020; Klein 1971; Sanders 1994; Huff 1996; Valdez et al. 2009; Vasquez et al. 2010). Moore and colleagues (Moore et al. 1983) further suggest that it is not uncommon for East Los Angeles gang members to reside outside of their claimed turf and to routinely travel back to these locations to socialize (see also Valasik and Tita 2018). Therefore, it is reasonable to suspect that if a vehicle is being utilized by a gang member to return to their gang's turf that it would also be accessible for a directed attack on a rival if needed. This study defines a drive-by (1 = yes and 0 = no) as an incident in which one gang member discharged a firearm towards another gang member from a moving vehicle. Lastly, from a routine activities perspective, time of day influences the activity patterns of gang members, thereby impacting gang-related violence. Three dichotomous variables are constructed to capture the different times of day in which a homicide could transpire: work hours, early evening, and overnight. Incidents were coded based on when the homicide event transpired (1 = transpired in the time period and 0 = did not transpire in the time period), with work hours being from 7 a.m. to 6 p.m., early evening being from 6 p.m. to 11 p.m., and overnight being from 11 p.m. to 7 a.m.

5. Results

On the basis of the analyses, there were five separate classes of gang-related homicides. One of the key results is that stranger versus non-stranger homicides had to be separated out since this distinction drove much of the variation in classes. Once it was realized that the main distinguishing characteristic between the classes was whether or not the participants, victim and suspect, knew each other or were strangers, the dataset was broken into two separate LCAs. Overall there were five separate classes found in the homicide data: three were non-strangers and two were strangers. In order to identify the best-fitting number of profiles, latent class models containing one through four classes for the non-stranger data and one to three classes for the stranger data were fit to exhaust the available models. To decide the final number of classes, we examined both fit statistics and whether or not the added class provided additional nuance to our understanding of gang homicide. Overall, improvements in fit (measured using AIC, BIC, and log-likelihood) occurred as the number of classes increased up to three classes for non-stranger gang homicides and two classes for stranger gang homicides.

For the non-stranger homicides there were three categories. Class 1, or Rival Drive-by ($n = 321$), homicides were characterized by the participants being from rival gangs. These homicides tend to employ a vehicle to facilitate a drive-by shooting. As such, the location of the incident is outside. Rival Drive-by homicides are also more likely to take place overnight, (i.e., very late at night or very early in the morning). Lastly, these homicides are not precipitated by a known crime or dispute.

To make these findings more tangible, the above results were used to identify an example of a "modal" Rival Drive-by homicide in our dataset.

April 2001: Around 1:50 a.m., two State Street gang members (a 36-year-old, Latino male and a 17-year old, Latino male) were repairing a vehicle on a street alongside a curb inside their gang's claimed turf. Two rival Primera Flats gang members (a 21-year-old, Latinx male and an unidentified Latinx male) proceeded to drive by and opened fire on the victims, striking both of them multiple times. The suspects fled southbound in their vehicle. The victims were transported to the LAC+USC Medical Center where they both succumbed to their wounds.

Note that the suspect and victims involved were from rival gangs, a drive-by was used, the incident took place outside on the street, it transpired overnight, and was a directed attack. That is, another crime or dispute did not facilitate the homicide.

Class 2, or Non-gang Involved Victim (*n* = 97), homicides are primarily characterized by the victim not being associated with a documented gang. Usually, these homicides are precipitated by another criminal act or drug-related activity. Non-gang Involved Victim homicides are more likely to involve multiple victims. In addition, these homicides may have the occasional drive-by, but they remain uncommon.

Selecting on the significant characteristics of this type, an incident from the case files of a modal Non-gang Involved Victim homicide is presented.

January 2001: At approximately 6:30 a.m., the two victims (33-year-old, Latino male and a 42-year-old, Latino male) were sitting in a vehicle when they were approached by two Lincoln Heights gang members (25-year-old, Latino male and a 29-year old, Latino male) who carjacked the vehicle with them inside. Two additional Lincoln Heights gang members (34-year-old, Latino male and an unidentified Latina, female) followed in another vehicle. The first victim was shot in the upper torso and was pushed out of the vehicle while it drove away. The next day, in the neighboring LAPD police division, the second victim was found executed with his hands tied behind his back. The murders were in response to the victims stealing drugs from Lincoln Heights gang members.

Notice that the multiple victims involved were not associated with any gang, the murders were in response to a drug rip-off, and while a vehicle was involved in crime, there was not drive-by. Instead, one victim was shot and left at the scene while the other was taken to a secure location to likely be interrogated in hopes that Lincoln Heights gang members will be able to recover the stolen drugs.

Rival Confrontation (*n* = 231), or class 3, homicides involve both participants being from rival gangs. These homicides often take place overnight (i.e., very late at night or very early in the morning). They are also more likely to transpire within the boundaries of public housing complexes. Rival Confrontation homicides are motivated by a dispute, either the result of an unplanned encounter or being driven by an enduring feud. These homicides seem to be more directed, resulting in a single victim as illustrated in the incident below.

July 1998: Around 5:30 a.m., two gang members, the suspects, from Cuatro Flats (25-year-old, Latino male and a 13-year-old, Latino male) approached a rival ELA 13 Dukes gang member (18-year-old, Latinx male) in the Aliso Village Public Housing Community. The prior week a group of ELA 13 Dukes had intervened in a head to head fight between the younger suspect, who was winning, and another ELA 13 Duke. The ELA 13 Dukes beat up the younger Cuatro Flats gang member and he wanted to get even. As the suspects approached the ELA 13 Dukes gang member they asked for some crack cocaine as a distraction, before pulling out their guns and shooting the victim. The suspects then fled the scene on foot.

The above example highlights that a prior altercation, in this case a fight, was what facilitated the homicide, involved participants from rival gangs, the event transpired in a public housing community where the suspects' gang claims turf, and the event took place in the early morning.

For stranger homicides there are two classes. Class 4, or Crime Prone Age (*n* = 134), homicides are characterized by the victim being in the 14–22 years old age group. Additionally, there is no gang relationship between the participants, given that the victims do not have any known associations with any Hollenbeck gangs. These homicides are also likely to be the result of a drive-by shooting and are more likely to take place overnight (i.e., very late at night or very early in the morning).

The case narrative presented below illustrates the characteristics which distinguish Crime Prone Age homicides.

December 2010: Around 2 p.m., the victim (18-year-old, Latino male) was sitting on a bench waiting for a bus. The two suspects, gang members from Cuatro Flats (18-year-old,

Latino male and a 26-year-old, Latino male) were driving down the road when they saw the victim sitting on the bench. The suspects quickly pulled over, exited the vehicle, and fired multiple shots at the victim. LAPD was approaching the scene as the suspects were about to flee, in which they abandoned their vehicle and ran away. Both suspects failed to elude LAPD and were taken into custody shortly after committing the murder. The detectives believe that the suspects mistook the victim for a Primera Flats gang member, since he was in their territory and both gangs are rivals. The victim never associated with any Hollenbeck gang and was only in the area to visit a friend.

This homicide highlights the fact that these incidents are likely to be the result of gang members having greater levels of entitativity (Vasquez et al. 2015). That is, gang members tend to consider any individual who is loitering within a rival gang's territory as being associated with that rival gang. As such, that individual becomes a potential target for violence, with gang-related violence spilling over into the non-gang population. Thus, Crime Prone Age homicides are likely to include a lot of cases in which a younger victim is being mistakenly identified as a rival gang member by the suspect.

Lastly, class 5, or Older Dispute (*n* = 61), homicides feature a victim in an older age category. The gang relationship between participants is that the victim and suspect are members of gangs that are not rivals with each other. Older Dispute homicides are preceded by some type of dispute that escalates to lethal violence. These homicides also are more likely to transpire inside a building or residence and take place after work hours in the early evening.

On the basis of the significant characteristics of this type, an incident from the case files of a modal Older Dispute homicide is presented below.

May 2007: Just after 7:00 p.m., the victim, an Indiana Dukes gang member (26-year-old, Latino male) was shopping with his girlfriend and their child at a Food 4 Less grocery store. Two Laguna Park Vikings gang members (21-year-old, Latino male and a 17-year-old, Latino male) began verbally accosting the victim with a "Where you from?" The victim called them for disrespecting him in front of his family. The suspects apologized, but the victim said it was too late. Each party flashed knives at each other, and the suspects said they would wait outside in the parking lot for the victim. As the victim exited, he struck a suspect in the face and then was shot by the other suspect.

The above example illustrates that these incidents involve a suspect and victim who are gang members, but whose gangs are not actively feuding or rivals. Instead, the violence is sparked by some form of disrespect or affront to on the participants, culminating in lethal violence. Additionally, the incident transpired in a neutral location, outside of either participant's gang's turf.

6. Discussion and Conclusions

In building on the literature on homicide disaggregation, this study addresses an important gap in the literature: How does the variation in the circumstances, motive, setting, participant characteristics, and rivalry relationship in gang-related homicides distinguish one type of event from another? The objective was to systematically ascertain which participant and incident characteristics differentiate discrete subtypes or classes of gang-related homicide using LCA. The results of the LCA clearly indicate that there are substantial differences in gang-related homicides, supporting the premise that further disaggregation is needed to fully understand that nature of these incidents of lethal violence. Specifically, the LCA revealed that a five class solution (three classes for non-stranger and two classes for stranger) was both appropriate and meaningful in terms of the theoretical focus in understanding gang-related violence. The relationship between the participants, victim and suspect, is an important characteristic driving the creation of the five subtypes/classes of gang-related homicide detected in this study. There clearly exists distinct patterns in gang-related homicides.

While the five classes of gang-related homicide tend to be quite distinct from one another, in terms of the participant and incident characteristics, there does appear to be

similarities between class 1, Rival Drive-by, and class 4, Crime Prone Age. Gang violence between rivals quickly becomes an intergenerational process with younger members being provided with a well-known adversary to attack. The gang literature indicates that group solidarity is a fundamental feature that drives gang-related violence with street gangs adhering to a principle of collective responsibility (see Bolden 2020; Densley 2013). That is, any member of gang acts as a representative for the entire group. Thus, if a gang member is attacked by a rival gang member the act is considered to be an affront by the entire rival gang. As such, gang members tend to have greater levels of entitativity, making "all members of the offending group blameworthy" (Vasquez et al. 2015, p. 249). Additionally, gangs tend to view any individual that resides in a rival gang's territory and resembles the demographics of the rival gang as being associated with that rival gang and a potential target for retaliatory violence. It is not shocking when retaliatory gang-related violence (e.g., Rival Drive-by homicides) spills over into the civilian population ensnaring victims not associated with a street gang (e.g., Crime Prone Age homicides). Leovy (2015, p. 206) documents this phenomenon in South Central Los Angeles affirming that "a black assailant looking to kill a gang rival is looking before anything else, for another black male . . . a presumed combatant, con-scripted into a dismal existence 'outside the law' whether he wanted to be or not." It seems likely that Crime Prone Age, class 4, homicides are essentially defective class 1, Rival Drive-by, homicides.

The contributions of this study provide a more nuanced understanding of the variation that exists in gang-related homicides; however, it is not without limitations that future research could work to address. First, the focus is on a relatively small area within one police jurisdiction (LAPD). As such, the results may be restricted to areas more similar to Hollenbeck. Future research could remedy this by expanding from the division level out to include other jurisdictions, and researchers will be better able to understand if these classes maintain across place and improve generalizability. Second, Hollenbeck's gangs are also very homogenous. Demographically the gangs are predominately composed of members of Mexican American descent. Structurally the gangs are considered to be "traditional" in nature, with strong territorial dispositions and intergenerational linkages (Klein and Maxson 2006). It is possible the findings from this study may be limited to communities where only "traditional" gangs are dominant. Third, the dataset includes several years of increased levels of gang violence in a highly active gang area (see Costanza and Helms 2012; Howell et al. 2011; Howell and Griffiths 2018; Valasik et al. 2017). Additional replications across a variety of jurisdictions will help validate how these classifications hold across time periods. There may also be other variables captured in different databases that would better capture the variations the exist within gang-related homicides.

Noting such limitations, the goal of this study was to test whether or not gang-related homicides could (and should) be disaggregated in a manner similar to how researchers currently disaggregate other homicide types. The purpose for disaggregating homicides is to be better able to understand important differences between types of homicides for policy, law enforcement response, and research. Since patterning is found in gang-related homicides, it does not make sense to continue to lump all gang homicides together in larger studies. Policy and practice should take this into consideration when targeting/investigating gang homicides. By understanding variation in covariates of different homicide types, this micro-analysis of gang-related homicides in a local setting is important to uncover how this variation can be used to better understand non-structural characteristics of gang-related homicide. Since this study is exploratory in nature, it is the first step for future research to continue disaggregating gang-related homicides across time and place to see how covariates vary, considering the type of gang-related homicide may impact a planned intervention. For example, not all gang-related homicides will respond equally to the same intervention (i.e., k- rails for drive-bys) (see Lasley 1998). Just as no two gangs are identical, the same idiom applies to acts of gang-related violence.

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Evolving Patterns of Aggression: Investigating the Structure of Gang Violence during the Era of Civil Gang Injunctions

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Abstract: Mapping the structural characteristics of attack behavior, this study explores how violent conflict evolved with the implementation of civil gang injunctions (CGIs). Networks were generated by linking defendants and victims named in 963 prosecutions involving street gangs active in the City of Los Angeles (1998–2013). Aggregating directed ties to 318 groups associated with the combatants, we compare four observations that correspond with distinct phases of CGI implementation—development (1998–2001), assent (2002–2005), maturity (2006–2009), and saturation (2010–2013). Using a triad census to calculate a ratio of simple patterns (retaliation, directed lines, and out-stars) to complex three-way interactions, we observed that CGIs were associated with a substantive thickening of conflict—greater complexity was found in conflict relations over time. Dissecting the nature of change, stochastic actor-oriented models (SAOMs) show that enjoined gangs are more likely to initiate transitive closure. The findings suggest that crime control efforts must make regular adjustments in response to the evolving structure of gang interactions.

Keywords: street gang violence; civil gang injunctions; conflict network; social network analysis

1. Introduction

The harm generated by gang violence extends beyond members and their rivals, threatening entire communities. The murder of Michael (20) and Timothy Bosch (21) illustrates this point. The brothers were hanging out in Culver West Alexander Park on 27 September 2003 (Noonan 2008). A Culver City Boys (CCB) gang member approached, and pointing a gun to Timothy's head, declared his affiliation and asked whether the victims belonged to a rival gang. Not believing the victims' denials, the brothers were shot. Bystanders are also caught in the crossfire. Melody Ross (16), a cheerleader at Wilson High School in Long Beach had just left her homecoming football game in 2009 and was sitting with a friend on a curb outside her school. Nearby stood two Rollin 20's Crips gang members, both of whom were not students. Melody did not know them. Two Insane Crips rival gang members approached, exchanging gang slurs with the Rollin' 20's Crips. One of the Insane Crips shot in the Rollin 20's Crips direction. Both Rollin 20's Crips were wounded: Melody Ross died (Vives and Bolch 2009). As these cases show, gang violence puts all members of the community, gang and non-gang involved, at great risk.

To stop the spread of violence, the City of Los Angeles adopted several crime control strategies, one of which was to enact civil gang injunctions (CGIs) targeting the most violent groups. Across successive administrations, three City Attorneys enacted a total of 46 civil gang injunctions targeting 72 gangs.

One of the aims behind the use of injunctions was to suppress the kinds of social interactions thought to facilitate gang violence. A critical feature of most CGIs is a clause designed to restrict a gang's ability to exert a visible public presence in specific neighborhoods.

While research shows that focused crime-reduction interventions can reduce crime (Braga and Weisburd 2012), there is still a need to understand how targeting the most problematic actors, such as the most violent gangs by implementing a CGI, impacts the larger community. Why? Because gang violence is an inherently social phenomenon (Lewis and Papachristos 2020)—embedded in a community of combatants, targeting one gang is likely to generate ripple effects throughout the social landscape that includes other groups with whom the target gang interacts. Targeting one, or a set of highly aggressive gangs, stands to reshape the structure of violence across the conflict network.

By understanding how crime control efforts shape networked violence, we are in a better position to develop interventions that minimize displaced aggression, reduce gang conflict, and improve public safety. While the structure of gang violence has been investigated within a single gang (e.g., McCuish et al. 2015), within identifiable neighborhoods and large regions (e.g., Randle and Bichler 2017; Tita and Radil 2011; Radil et al. 2010), and across cities, i.e., Boston (Papachristos et al. 2013), Chicago (Lewis and Papachristos 2020; Papachristos 2009), Montreal (Descormiers and Morselli 2011), and Newark (McGloin 2007), to the best of our knowledge, this study is among the first to investigate shifting patterns in the structure of street gang violence associated with a protracted crime control strategy such as CGIs. The present study extends network investigations of gang conflict by comparing four violence networks generated from incidents occurring within a 16-year study period (1 January 1998–31 December 2013). Our primary aim is to document whether there were substantive shifts in the structure of violence that correspond with phases of CGI adoption in the City of Los Angeles.

This paper unfolds as such. Before we outline how we investigated gang violence networks, we briefly describe CGIs as implemented in California and explore current thinking about violence networks and the implications for gang control strategies. After describing the methodology used, we report on two sets of analyses—triadic censuses and stochastic actor-oriented models—before discussing the most salient implications of this investigation of gang-involved violence.

2. Background

2.1. CGIs and Focused Deterrence

CGIs are a crime control strategy designed to impose behavioral restrictions on gangs and/or gang members within designated areas. The City of Los Angeles defines a gang as a group of allied individuals working toward a common purpose who engage in violent, unlawful, or criminal activity to achieve their aims. The group brands itself with symbols (e.g., tattoos and colors), often has common demographic characteristics and may exert control over specific areas within neighborhoods (Los Angeles Police Department 2020). CGIs fall under California Civil Code, sections 3479 and 3480, which permit civil restrictions on activity found to be a public nuisance. Of interest to the present study, CGIs impose restrictions on public behaviors within designated areas, known as "safety zones". Gang members can be subjected to enhanced penalties for engaging in illegal behavior in the safe zone (e.g., selling drugs, vandalism, and threatening/intimidation). Other specifications may require individuals to adhere to a curfew or avoid hanging out with other gang members in public (this includes driving, walking, standing, or appearing together in the public's view). Restrictions are also imposed on the gang itself such as; no gathering in public areas, no lookouts or loitering, and no recruiting children.

CGIs can be framed as a focused-deterrent strategy directed at reducing gang-involved violence. Focused deterrence is a problem-focused policing approach, which calls for targeting individuals or groups that are driving crime in specific areas (Braga and Weisburd 2012). Those who violate CGIs may face civil sanctions, such as financial penalties (up to $1000) or they may receive gang enhancements on their sentences (up to 25 years). These sanctions are meant to send a clear message to targeted individuals that the cost of engaging in the prohibited behaviors is high. By imposing behavioral

restrictions and increasing penalties for engaging in those behaviors, CGIs are intended to deter gang violence in the community.

Implicit in the use of CGIs is the notion that social interactions trigger violence. For example, violence may occur when gang members congregate in public space, particularly if the location is known to be linked to a specific gang member (i.e., someone's home) or controlled by the gang (e.g., established turf or set space). Here, social interactions expose individuals to risk when rivals pass by looking for conflict. Thus, some of the stipulations included within CGI conditions aim to remove opportunities to become involved in social interactions that may lead to violent altercations, i.e., do not drive, stand, sit, walk, gather or appear with other gang members in public view or anyplace accessible within designated areas of the city (usually areas claimed as gang turf).

Most studies examining the effectiveness of civil gang injunctions explore the reduction in crime within designated areas. Studies find that CGIs are associated with a decline in serious and violent crime in areas with safe zones (e.g., Carr et al. 2017; Grogger 2002; Los Angeles County Civil Grand Jury 2004; Ridgeway et al. 2019). While previous research has found most crime control effects to be short lived (e.g., Maxson et al. 2005; O'Deane and Morreale 2011), a more recent study by Ridgeway et al. (2019) examining quarterly crime reports from the Los Angeles Police Department (LAPD) between 1988 and 2014 found a 5% short-term decline in crime, as well as a 18% long-term decline in crime in targeted areas. Even though research examining the impact of CGIs on levels of crime in focal neighborhoods have typically found positive effects, studies focusing on individuals targeted by the CGIs have been less encouraging. For example, interviewing gang members subjected to CGI restrictions, Swan and Kirstin A. (2017) discovered that individuals continued their gang activities after CGIs were imposed on them; their activities shifted to neighborhoods without gangs or to rival gang territory, which intensified existing conflict. Exploring the structure of post-CGI conflict among 23 Bloods and Crips gangs, (Bichler et al. [2017] 2019) discovered the most aggressive gangs became more enmeshed in a web of violence and more centrally located in chains of violence post-injunction—CGIs were associated with increased violence (Bichler et al. [2017] 2019).

Why would violence increase post-CGI? Because, as much as CGIs may help to remove opportunities for conflict, they also contribute to reshaping the local social landscape, which may displace, alter the nature of, or generate more violent conflict. Each gang is embedded in a local social system wherein groups vary on their perceived social standing within the community (e.g., dominance and street respect), control of resources (such as drug sales), and physical proximity to other groups (Lewis and Papachristos 2020). The imposition of a CGI is a public announcement that the group is under increased scrutiny and that their public behavior is restricted. As such, CGIs alter the local social system, and may push gangs to other areas to remain competitive (e.g., expanding drug markets by invading rival territories), leading to more aggression. It is also plausible that as enjoined gangs refrain from public displays of dominance, their territorial control may faulter leading other groups to attack. Thus, investigating how the social landscape of gang-related violence changes in response to coordinated crime control interventions enriches our understanding of conflict dynamics in a way that may support the development of more effective prevention measures.

2.2. Networked Violence

The dynamics of gang violence are complex and constantly shifting. Research in this area has regularly focused on the behaviors of the gangs and/or individual gang members; often using ethnographic and survey-based research, to understand changes in gang-on-gang violence. Studies examined gang cohesion (Decker 1996; Hennigan and Sloane 2013; Klein and Maxson 2010; Papachristos 2013), motivating factors for gang behavior such as turf disputes (Braga et al. 2006; Papachristos et al. 2010), social influences (Hennigan and Spanovic 2012; Stafford and Warr 1993), and interpersonal disputes (Papachristos and Kirk 2006); as well as, the amorphous nature of gang membership (e.g., Decker 1996; Melde and Esbensen 2013) to understand shifts in violence. Contributing to this body of work, we concur with recent arguments suggesting that there is a need to use structural

metrics to understand how violent social interactions among pairs of gangs shape gang violence at the community level (e.g., Lewis and Papachristos 2020).

Violent encounters involving gang members do not occur in isolation. Rather, gang members are embedded within an intricate web of social relations that aggregates to form a complex network of interlinkages binding gangs within a larger community of violence. At the individual level, individuals respond to what they learn or experience, and in turn, this reaction facilitates additional ripple effects, often spreading in a hyperdyadic process toward new people (*See*: Christakis and Fowler 2009). For instance, when a gang member suffers an injury or perceived harm to reputation or status, the individual (or group acting on their behalf) will react in some fashion, often in an effort to reciprocate harm (e.g., Papachristos et al. 2013, 2015). Notably, the individuals involved in the initial act of violence may not be the actors who retaliate. Instead, other members of the group may initiate violence, toward the original aggressor or someone else associated with the aggressor's gang. Thus, there are advantages to aggregating violent conflict to the group level when examining the pattern of conflict—gang-on-gang attacking behavior may better capture the web of conflict.

While an initial act of violence can set a sequence of interactions into motion, fueling continued conflict, transference or retaliation is not necessarily the most likely outcome (e.g., Randle and Bichler 2017). Investigating the likelihood of direct retaliation (reciprocated violence) relative to other reactions, Lewis and Papachristos (2020) also find evidence of generalized retaliation wherein gangs unable to reciprocate directly against the group that murdered one of their own, launch attacks directed at other gangs. Of critical importance in understanding how violent conflict ripples through communities is the structure and topography of the local social neighborhood. Structural hierarchies are likely to exist that reflect local patterns of social dominance. In network terms, the local social neighborhood includes everyone a focal individual is directly connected to, referred to as alters, as well as all the links among those alters. Local social neighborhoods are important because they influence what information groups receive and how they react to events, providing a glimpse into the social context within which a focal gang is embedded. These patterns may be indicative of competitive dominance (Brantingham et al. 2019).

Figure 1 illustrates two sets of interaction patterns that may result from an initial violent event. Circles represent gangs and the directed arrows originate at the aggressor and terminate at the victim. The dashed arrows depict the reaction from an initial aggression (solid line). Looking at the transmission of aggression, three simple structures are profiled. Direct retaliation by the aggrieved group may occur when groups have equivalent stature within the community. Imbalanced patterns of violence may indicate the groups have unequal social status. For instance, a knock on or domino effect representing a directed line suggests that the victimized gang is unable to respond directly, instead they attack another group of lesser status. When direct retaliation does not occur, the group can become emboldened, reacting to their "success" by launching several attacks aimed at different groups (referred within network analytic approaches as out-star structures) to improve their position of dominance.

Prior research using network analytics observe different hierarchical structures that may reflect differential positions of competitive dominance. For instance, mapping conflict among 158 primarily Blood and Crip gangs active in Los Angeles, Randle and Bichler (2017) discovered a high level of internal conflict (within group violence), in-star and out-star structures (wherein a group was attacked by multiple gangs, or a gang attacked many others), and directed lines (one gang attacks another who then attacks a third group). More in tune with the present study, (Bichler et al. [2017] 2019) investigate the structure of violence for 23 Bloods and Crips gangs under civil gang injunctions, in the City of Los Angeles. While there is a tendency for the most violent groups to be victimized the most, local hierarchies exist (e.g., directed lines); and attack networks change significantly over time. Investigating murder in Chicago, Lewis and Papachristos (2020) significantly extend this line of inquiry by testing the likelihood that different local structures shape the larger network of violence, discovering that direct reciprocity differs by group attributes (e.g., race) and that other more complex structural features, associated with generalized reciprocity, vary significantly over time when short observation

windows are used (e.g., two years). Of note, these authors also found that a few particularly aggressive groups are central to spreading violence through the network (in network terms this is *activity spread*) and that when two gangs are attacked by the same aggressor, they attack each other (reflecting the network structure called *popularity closure*).
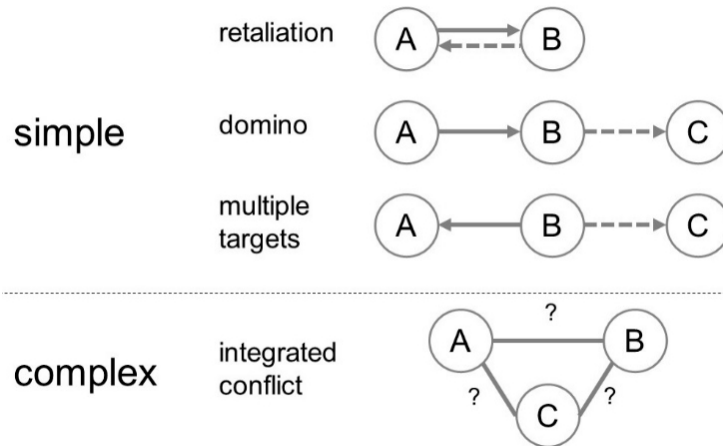

Figure 1. Structure of Violent Conflict.

Complex structures, like popularity closure, involve three-way relations of integrated conflict among a set of actors A, B, and C: these structures may reflect a social hierarchy of dominance among gangs (Papachristos 2009; Papachristos et al. 2013). When someone from gang A kills a member of gang B, and a member of gang B responds by attacking a third party from gang C, a triadic structure emerges that closes the loop: the loop closes when the third party to the violence, gang C, shoots a member from gang A. To illustrate that there are many different complex structures in addition to the scenario just described, the lines labeled with question marks in Figure 1 can be replaced with directed arrows. Specifically, there are seven different configurations of interest: A→B←C, A→C; A←B←C, A→C; A←B→C, A←→C; A→B←C, A←→C; A→B→C, A←→C; A→B←→C, A←→C; and A←→B←→C, A←→C.

Mapping the network of violence that emerges from local conflict, provides insight into the larger community dynamics that may facilitate aggression. It is possible to support interdiction efforts by observing change in these patterns. Where gang violence is characterized by simple structures, and prolific aggressors dominate, crime control strategies may best target the main instigators of violence, particularly when there is a small set of aggressors generating pockets of violence. Where the ratio of simple to complex structures favors integrated patterns of conflict, a multi-faceted approach targeting inter-related sets of gangs may yield greater violence reduction. Crime control strategies would stand to be more effective if a set of combatants were targeted, rather than a single aggressor.

2.3. Current Study

The imposition of a civil gang injunction is, without doubt, a clear public admonition of a group's behavior. As such, it should trigger a shift in violent behavior, in either the frequency of aggression, direction of attack, or selection of targets (Randle and Bichler 2017; Bichler et al. [2017] 2019). While individual level changes in behavior are expected as police officers interact with specific gang members, the sanction is directed toward the entire group. By aggregating individual-level interactions to the gangs each combatant affiliates with, we can map out emergent gang-on-gang conflict patterns (Lewis and Papachristos 2020). Joining the local social conflict neighborhoods of individual gangs will reveal the emergent community structure of violent relations.

By examining an entire community of conflict, we extend prior research that investigated a single gang (e.g., McCuish et al. 2015), a single neighborhood (e.g., Brantingham et al. 2019), or drew from a subset of gangs sharing a characteristic, i.e., predominantly African American gangs, such as

Bloods and Crips (Randle and Bichler 2017; Bichler et al. [2017] 2019). In addition, comparing across successive waves of observations offers a way to explore the cumulative effect of multiple CGIs on the structure of violence. As more gangs are enjoined, the effect of this crime control strategy may evolve. To date, only one study has documented the long-term effect of the CGI experience in Los Angeles (see Ridgeway et al. 2019): while this spatial investigation revealed neighborhood trends, it was unable to expose changes in the social interactions among gang members. For instance, violence may decline in affected neighborhoods if CGIs drive gang members away. However, as Swan and Kirstin A. (2017) discovered through an ethnographic study involving interviews with gang members, criminal behavior and interactions may shift to communities in other cities (not proximate displacement)—a network approach is needed to investigate this possibility.

Our general expectation is that aggression levels change following the imposition of CGIs, with targeted gangs becoming more deeply embroiled in complex patterns of violence (Bichler et al. [2017] 2019; Lewis and Papachristos 2020). Gang associations are dynamic (Ouellet et al. 2019), and as individuals respond to perceived harms to address challenges to social status (Papachristos 2009), conflict may erupt that involves unexpected combatants (Descormiers and Morselli 2011), particularly given that the structure of violent relations is unstable, shifting substantially between observations (Lewis and Papachristos 2020). The imposition of a CGI is a gang-specific attack, and successive attacks on groups operating within a street gang community could generate a cumulative effect that substantively alters the structural indicators of competitive dominance. With little prior work documenting the nature of structural change to expect, we posit that while the embeddedness of conflict is likely to be unstable, the overall tendency should be that complexity will increase given that gangs may shift activities to new areas (Swan and Kirstin A. 2017). At the community level, as more gangs are enjoined there may be a saturation effect, thus, when the CGI adoption curve reaches the assent and maturity phases this should correspond to shifting ratios of simple to complex patterns across successive observation periods, i.e., more popularity closure. At the gang level, the most aggressive groups may exhibit a significant growth in dominance, meaning they attack more following the imposition of a CGI.

3. Methods

3.1. Case Identification and Network Generation

A 2-step sampling method was used to identify cases of street gang violence (*See:* Figure 2). The first step involved identifying cases associated with seed gangs. Seeds are the starting actors used when sampling with a link-tracing method. In this study, seed gangs include all LA-based gangs (and cliques) named in civil gang injunctions filed in the City of Los Angeles between 1 February 2000 and 24 September 2013. We used the advanced search parameters of Westlaw and LexisNexis to restrict the hits returned to California court cases occurring within the designated observation period. Next, all other gangs associated with named victims or co-offenders were searched. Formal names and variations of gang names were used in this second step to ensure comprehensive case capture. The 2-step sampling procedure generates complete egocentric networks for 76 seed gangs and 122 alters (groups involved in conflict with the seed gangs). In general terms, this sample constitutes 198 case studies. Egocentric networks include the focal actor (e.g., each seed gang) and all connections among those actors directly connected to focal actors (alter gangs). Representing the local social world in which actors are embedded, egocentric networks provide a glimpse into the social network as seen from the actor's perspective. The 120 additional groups identified in the second step (see the secondary alters illustrated with white symbols in Figure 2) constitute the boundary of the network, as we do not have complete information about the conflict patterns involving their local social neighborhoods.
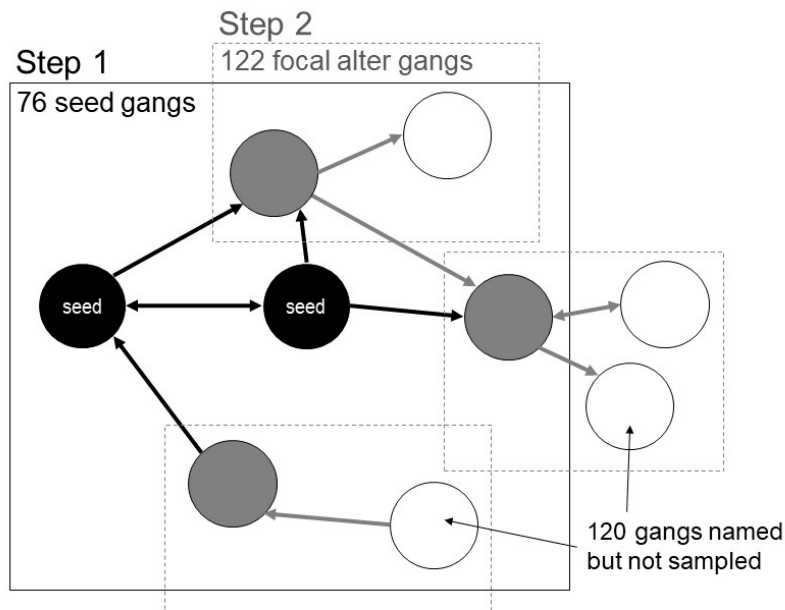
Figure 2. The 2-Step Sampling Process.

The sampling procedure generated 4610 cases. Four inclusion criteria were applied to focus the investigation on gang violence originating from the City of Los Angeles:

1. The case involved at least one gang known to be based in the City of Los Angeles;
2. There was at least one charge/conviction for a violent crime (e.g., assault with a deadly weapon, attempted homicide, or homicide);
3. At least one defendant was tried as an adult;
4. The crime occurred between 1 January 1997 and 31 December 2016 somewhere within the five-county study region—Los Angeles, Orange, Ventura, Riverside and San Bernardino.

As illustrated in Figure 3, this screening protocol reduced the sample to 993 cases—35 additional Mexican Mafia cases were identified but not included here as they did not involve a direct act of violence perpetrated by this group.
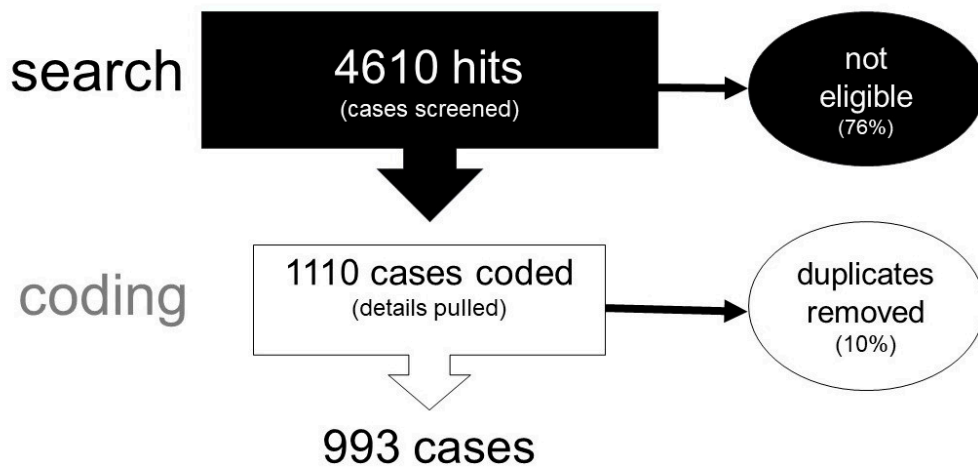
Figure 3. Case Identification Protocol.

Extracting information from the 993 cases found to satisfy all inclusion criteria, we identified 1771 defendants and 1944 victims[1]. Exploring combatants' age was challenging given a large amount of missing information (27% of subjects); however, incidents regularly involved interactions among adults and young people (only 35 cases were known to involve only juveniles or minors). Exploring age further, approximately 20% of individuals (n = 3004 individuals with age reported) involved in these violent conflicts were known to be under 21 years of age (16.6% were juveniles; 3.1% were minors). From a case perspective, 34% of cases (*n* = 993) involved at least one minor or juvenile, and from a group perspective, 55% of 307 street gangs observed in this sample were involved in at least one conflict involving someone reported to be under 21.

Approximately 77% of cases (*n* = 993) involved murder or attempted murder, with the remainder distributed across robberies (12%, including carjacking), assaults (9%) and other types of violence (2%). Most incidents involved gun crime (91%). Investigating incident location, we discovered that 70% occurred in the City of Los Angeles, and while the remaining 30% of cases transpired in 84 different cities spanning from Oakland to San Diego, most occurred in cities within a one-hour drive (no traffic) from Los Angeles. Within the City of Los Angeles, violent incidents occurred in 97 identifiable neighborhoods or areas.[2] Most cases involved a social context wherein offenders did not act alone, such as parties or other social gatherings, however, 64.9% of cases list co-offenders and approximately half of these incidents (31% of cases) describe 2 or more co-offenders. In approximately 51% of cases, a single victim was named.

Valued, directed conflict networks were generated by linking each defendant and accomplice named in the case to each identified victim. As such, directed ties (referred to as arcs) represent acts of aggression. This means that if there were two co-offenders and one victim, two arcs were generated; two co-offenders and two victims resulted in four directed acts of aggression; and one offender attacking three victims resulted in three aggressions. Amplifying the amount of violence in this way permits us to weight the network to reflect the dominance of gangs. When multiple gang members attack, or a lone offender victimizes a group of people, community impacts are magnified as this level of aggression stands to inflict greater street terrorism.

Associated gangs and cliques were recorded for each offender and victim. Due to the extensive amount of missing clique information, we aggregated ties by the gang in order to investigate gang-on-gang violence. Since some victims were not known to be affiliated with a gang, 11 additional group categories were used—7 law enforcement and criminal justice agencies, and 4 community groups (community, drug dealer, drug involved, and pimps).

Investigating the number of cases identified per year, we discovered censuring: few cases occurred before 1998 or after 2013.[3] As a result, we reduced the 20-year observation period to a 16 year period.

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[1] Inter-rater agreement was assessed on case inclusion criteria and identification of variables capturing defendant characteristics, victim characteristics, witness characteristics, characteristics of other individuals involved in the case (e.g., gang experts and responding officers), and situational elements of the case. Coders were assessed on a training sample of cases raging in difficulty level (the most difficult cases involving multiple incidents spanning across different periods of time, each period consisting of different incident elements). We observed a Cohen's Kappa of 0.84, indicating substantial agreement between the ten coders (Landis and Koch 1997). However, when just looking across defendant and victim characteristic the agreement increased (k = 0.96). This indicates that in capturing the defendants and victims' names, aliases, demographics, and which gangs they belong to, there was almost perfect agreement. Subsequent random spot checks of coding confirmed reliable retrieval of offenders, victims, and their gang affiliation.

[2] The inclusion criterion specified that at least one individual associated with a case was known to be an active member of a gang based in the City of Los Angeles, but the incident did not have to occur within the city boundaries. For instance, a gang member from Los Angeles could travel to San Diego and become involved in a violent altercation with a gang local to the San Diego region. Moreover, only one person involved in the incident had to have a Los Angeles affiliation, other participants (accomplices and victims) were not required to be, and as such, the gang violence represented by this sample was observed to spill out from the City of Los Angeles into proximate and distal locations. In addition, due to economic and social conditions affecting housing availability and regional migration patterns associated with the 2008 economic crisis, many LA-based gang members relocated from the city to suburban locations, such as Lancaster. Thus, regional migration patterns may also contribute to the observed spread of incident locations.

[3] Censuring resulted from two factors: (1) left-censoring corresponds with the origin of the development of digital case retrieval systems, i.e., LexisNexis; and right-censoring corresponds to court processing timeframes.

As discussed shortly, this distribution better mirrors the trend in CGI enactments, and only results in a 3% loss of cases.

Applying final data cleaning protocol, we arrive at the sample used in this analysis. The final sample is drawn from 963 cases and includes 318 groups with 3710 arcs (representing 625 unique conflict dyads). The loss of 4.6% of arcs (179 offender/victim dyads) is the byproduct of missing case details—23 ties were lost due to missing information about the year when the crime occurred and the rest were lost due to missing gang affiliation (e.g., a victim or offender was described as a gang member but the gang was not named). Despite finding a high level of connectivity—96.6% of groups are linked in one large connected structure—the conflict network exhibits low cohesion. Of all the possible conflict combinations, 3.4% of the groups were connected by at least one act of violence.

3.2. Analytic Framework

To investigate the cumulative impact of CGIs across 16 years, we used four observation periods—development (15% of CGIs filed from 1998–2001), assent (40% filed 2002–2005), maturity (35% filed 2006–2009), and saturation (10% filed 2010–2013). CGIs are inherently a prosecutorial crime control mechanism aimed at addressing chronic community crime problems, thus, exploring the change in cases generated is an appropriate analytic framework. We considered the social-legal context of the adoption curve of what was at the time, an innovative crime control strategy, when developing observation periods. The development period constitutes a baseline under the leadership of Los Angeles City Attorney James K Hahn, during which this wave of CGIs began. This period includes two years prior to the filing of the first CGI in order to capture the violent events that generated the political and community impetus leading to the use of this gang control strategy. The next two periods encapsulate growing use of this innovation, split between assent and maturity periods, both of which span City Attorney Rockard J. Delgadillo's term in office. The final observation captures the saturation phase in the adoption curve of CGI implementation in Los Angeles; during this period, Carmen A. Trutanich was the City Attorney of Los Angeles.

Since network structures are based on relational data, our analytic approach includes two procedures, each designed to account for interdependence between observed relationships (Krackhardt and Stern 1988). First, we use a triad census to catalogue the different classes of simple and complex structures found in each phase of CGI adoption. Triad counts have long served as a foundation upon which to generate theories about relational patterns, when studying associations among sets of three people (*See*: Wasserman and Faust 1994). With few prior studies investigating in detail, there is little evidence upon which to select specific local patterns of street gang violence that may give rise to the overall network structure observed during each phase of CGI adoption (*See for example*: Lewis and Papachristos 2020). If the overall complexity of conflict changes, as identified by the triad counts, we can dissect the nature of change with stochastic actor-oriented models (SOAMs).

SOAMs are part of a class of longitudinal statistical modeling techniques (part of the exponential family of random graph models, or ERGMs) used to test hypotheses about factors thought to be conducive to change or evolution in the network. Several theoretical assumptions underly these kinds of models, e.g., patterns reflect structural processes, and networks are dynamic and react to multiple, simultaneous processes (Robins and Dean 2013, p. 10). Focused on the decisions of actors, SOAMs assume that actors control their outgoing ties, making changes to meet their needs and circumstances. These changes advance actor objectives. For instance, with regard to competitive dominance, efforts to restore a gang's reputation may lead a gang to attack the group who previously victimized them (reciprocity) or to attack a group already victimized by other gangs (indegree popularity). SOAMs differ from other ERGMs in that they do not seek to explain the emergent network resulting from local connectivity, instead, the intent is to identify which factors explain changing network structure across successive periods. Thus, if our triad census uncovers a shift in structural complexity, these models can help dissect how the network evolved across successive phases of CGI implementation.

Using a method of moments maximum likelihood estimation process, these models run a multi-variate logistic regression to explain change in ties (formation or dissolution). Applied to gang violence, a tie forms when a new conflict occurs among pairs of gangs at T + 1, or T_2, and dissolves when a prior attack (occurring in T_1) is not repeated in T_2. In essence, this means that we can look at the relative impact of different change elements and interaction effects (e.g., the imposition of an injunction while controlling for the tendency of highly violent gangs to attack more over time), and we can do this while modeling cumulative effects of multiple CGIs. We generated parameter estimates with an initial value of gain set at 0.2, with deviation values calculated from 1000 iterations. Estimates are stable if convergence occurs and t-ratios are near a value of 0.1: our final models achieved this threshold. For an explanation of this application, see (Snijders 2011; Snijders et al. 2010; Ripley et al. 2020).

3.3. Network Descriptions

The conflict network observed for each period of CGI implementation varied in size and cohesion (see Table 1) and there was a substantial drop in the percent of groups embroiled in internal conflict during the maturity phase. Networks were characterized as having a low level of interconnectivity (measured with density), meaning that the webs of conflict were sparse, and over time, there was a slight decrease.[4] Groups were also generally characterized as being situated in star-like networks: this means that a gang may attack two other gangs, but those victimized gangs were not observed to fight each other. Clustering coefficients confirm this attack pattern. Theoretically, the average clustering coefficient ranges from 0, suggesting that the pattern of conflict ties linked to each gang looks more like a star centered on the focal gang, to a 1, where there would be a thickly connected mass of fighting.[5] As reported in Table 1, the average clustering coefficients ranged between a 0.08 and 0.14. This means that on average, gangs were not embroiled in tight dense clusters of fighting. [Note: following established protocol, the statistics reported that describe overall network structure were calculated on dichotomized networks. Ties in a dichotomized network are binary, meaning they are scored a value of "1" if any conflict occurred between the pair and "0" if there was no observed conflict.]

Networked violence evolved with each phase of CGI use. Looking at the network structure over time, the Jaccard Coefficient of similarity finds that between development and the assent phase only 12% of the conflict relations involve the same pattern of violence, meaning that for 12% of conflicts, the same aggressor and victim links exist.[6] Between assent and maturity, we found the most similarity in overall network connectivity, 16% of unique ties involved the same pair of groups in a consistent role (aggressor or victim). The least similarity was found between the maturity and saturation phases. Said another way, we can interpret these values to suggest that conflict patterns changed over time. The Pearson correlation coefficient tells us that while the tie structure changed, the value associated with ties (as used here this score reflects the number of aggressions) was somewhat consistent (the Pearson

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[4] Density is a measure of cohesion that calibrates how interconnected actors are within a network (Wasserman and Faust 1994, p. 101). As used here, this metric tabulates the number conflicts observed among gangs in the network, relative to the number of potential conflict relations that could exist if every gang was in combat with every other gang. High scores indicate that gangs are well connected.

[5] The average clustering coefficient is a measure of cohesion that is based on how many triplets (grouping of three actors) are present in a network (Watts 1999, p. 498). As used here, this measure calculates the number of threesomes (triplets) that are observed (sets of three gangs that are all in conflict with each other), relative to the all triplets that are possible (all permutations of sets of three nodes) that could exist within the network. Lower scores highlight that potentially important sub-groups exist within the network.

[6] The Jaccard coefficient of similarity is a measure of association, based on how many shared ties are present between actors when different observations of the network are compared. Networks must be binary and include the same actors (Hanneman and Riddle 2005). As used here, this statistic measures the number of conflicts among gangs that are present when observed at time 1 compared to a subsequent observation at time 2. The resulting score is the percentage of ties that are the same in two observations of the network.

was moderately strong).[7] Conflict relations with a lot of aggressions in one time period tend to also exhibit a lot of aggressions in the subsequent time period.

Table 1. Network Description by Phase.

Variables	Development (1998–2001)	Assent (2002–2005)	Maturity (2006–2009)	Saturation (2010–2013)
Network Size				
Groups	113	173	197	124
Aggression (unique attack arcs/total aggressions)	152/599	247/1315	264/1242	145/554
Internal conflicts (percent of unique conflicts)	16 (10.5%)	28 (11.3%)	22 (8.0%)	15 (10.3%)
Cohesion				
Number of components (connected structures)	10	8	15	9
Percent of groups in the largest component	78.8%	90.2%	82.7%	83.9%
Density	4.4%	4.0%	3.0%	3.4%
Average clustering coefficient	0.11	0.12	0.14	0.08
Structural Similarity				
Jaccard coefficient of similarity (with prior period)	–	12.0%	16.1%	10.1%
Pearson correlation coefficient (with prior period)	–	0.400	0.393	0.427

4. Results

4.1. General Structure of Violence—Simple vs. Complex

Exploring the structure of conflict through a triad census, we investigated the level of complexity interweaving groups that were involved in violence. Selecting specific patterns of conflict and tallying the number observed for each configuration provides an opportunity to calculate a ratio; where simple structures dominate, violence suppression efforts could independently target select aggressors, and where complex patterns emerge, actions require a coordinated approach focused on a set of interlinked combatants. While it is conventional to count many lower order simple structures, a shift in the ratio between types of structures over time can reveal important changes in the topography of conflict.

Across periods, we found a substantial amount of simple structures reflecting a domino pattern of aggression where one group attacked another, who in turn attacked a third group (see the percentages reported in Table 2). This pattern has been interpreted to suggest that groups are not of equal status or resources, and thus, groups are unable to retaliate for attacks. Instead they prey upon groups perceived as weaker than themselves (e.g., Papachristos (2009)). Of course, without detailed information about the specific groups involved, this interpretation is subjective. We also observed a relatively high level of multi-target attack behavior where one gang victimizes two other groups.

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[7] The Pearson correlation coefficient is a measure of association, like Jaccard; however, networks must be valued (Hanneman and Riddle 2005). This statistic calibrates the level of similarity of tie values, in this case, number of conflicts among pairs of gangs across two observations.

Table 2. Triad Census by Observation Period.

	STRUCTURE	DEVELOPMENT (1998–2001)	ASSENT (2002–2005)	MATURITY (2006–2009)	SATURATION (2010–2013)
SIMPLE [1]	Retaliation [2]	661 (14 ties; 9.6%)	1262 (16 ties; 5.8%)	1271 (16 ties; 5.5%)	142 (4 ties; 4.3%)
	Domino	79 (54.5%)	121 (43.8%)	162 (55.9%)	47 (50.5%)
	Multiple targets	52 (35.8%)	139 (50.3%)	112 (38.6%)	42 (45.2%)
COMPLEX [3]	3-way integrated conflict	16	33	44	12
RATIO OF SIMPLE TO COMPLEX		50:1	46:1	35:1	19:1

[1] Percentage distributions for simple structures are based on patterns of retaliatory conflict rather than permutations. For instance, the denominator in the development phase was 145 (14 reciprocal arcs, 79 domino patterns, and 52 multi-target attacks). [2] Retaliation sets counted in a triad census include situations where actors A and B have a mutual conflict, but no one attacks C. Internal conflict is ignored in this calculation. Since every permutation is counted, the reciprocity scores do not reflect the true count of reciprocated violence. Investigating actual situations where violence is reciprocated and is not linked to internal conflict, we count the following: 14 reciprocated ties during the start-up period), 16 reciprocal ties in the building period, 16 reciprocal ties in the peak period, and 4 reciprocal ties in the decline period. [3] Complex ties include seven configurations: triad sets 9–10 and 12–16 as listed by UCInet. Specifically, this includes A->B<-C, A->C; A<-B<-C, A->C; A<-B->C, A<->C; A->B<-C, A<->C; A->B->C, A<->C; A->B<->C, A<->C; and A<->B<->C, A<->C.

A prominent result of this inquiry was the dramatic change in the ratio between simple and complex structures. While the developmental period, when civil gang injunctions were first introduced, exhibited many simple structures (50:1), the violence network observed during the assent period exhibited a major structural change. As more gangs faced injunctions, the complexity of conflict patterns changed as indicated by the ratio. In the final two observation periods we found ratios decline precipitously. This suggests that gang violence in general became more integrated. The direct implication is that as the CGI strategy took effect, new or additional coordinated actions were needed to quell the conflict among *sets* of gangs.

A community level analysis offers insight into macro-level changes, but does not reveal if there were differential effects on enjoined gangs compared to non-enjoined gangs? Table 3 reports on the patterns of conflict observed for enjoined gangs compared to focal alters with no injunction. All groups with egocentric networks containing at least two alters were selected for this analysis. Then, a triad census was conducted for each phase. Since some gangs did not have sufficiently large egonets for each phase, the sample size varies. Overall, simple structures were more prevalent irrespective of injunction status. We found low levels of direct retaliation and a higher proportion of domino patterns (directed chains), with one notable exception. During the assent phase (2002–2005), when CGIs were being used more frequently, enjoined gangs were observed to shift to attacking multiple targets (out-star patterns). Of note, the ratio of simple to complex structures declined a little for enjoined gangs until the final observation, suggesting that there was a small increase in complex interactions as more groups were sanctioned. The pattern was different for non-enjoined groups, although, by the final phase there was no appreciable difference in ratios.

Table 3. Triad Census Comparing Egonet Structure of Enjoined Gangs to Focal Alter Gangs [1].

SAMPLE	STRUCTURE	DEVELOPMENT (1998–2001)	ASSENT (2002–2005)	MATURITY (2006–2009)	SATURATION (2010–2013)
74 ENJOINED GANGS [2]	*SIMPLE*	*99*	*218*	*183*	*56*
	Retaliation [4]	9 (9%)	12 (5%)	12 (7%)	3 (5%)
	Domino	57 (58%)	97 (45%)	101 (55%)	28 (50%)
	Multiple targets	33 (33%)	109 (50%)	70 (38%)	25 (45%)
	COMPLEX (3-way integrated conflict)	*23*	*51*	*61*	*16*
	RATIO	**4:1**	**4:1**	**3:1**	**4:1**
	AVG. RATIO [5]	5:1 (*n* = 43)	4:1 (*n* = 60)	3:1 (*n* = 56)	4:1 (*n* = 41)

Table 3. *Cont.*

SAMPLE	STRUCTURE	DEVELOPMENT (1998–2001)	ASSENT (2002–2005)	MATURITY (2006–2009)	SATURATION (2010–2013)
74 FOCAL ALTERS [3]	*SIMPLE*	*44*	*52*	*95*	*32*
	Retaliation [4]	2 (5%)	3 (6%)	7 (7%)	1 (3%)
	Domino	21 (48%)	25 (48%)	54 (57%)	19 (59%)
	Multiple targets	21 (48%)	24 (46%)	34 (36%)	12 (38%)
	COMPLEX (3-way integrated conflict)	*9*	*18*	*26*	*9*
	RATIO	**5:1**	**3:1**	**4:1**	**4:1**
	AVG. RATIO [5]	**6:1** (*n* = 41)	**3:1** (*n* = 55)	**4:1** (*n* = 52)	**4:1** (*n* = 43)

[1] Values reported sum the number of structures observed for all egos. [2] Cliques named in injunctions are omitted from this analysis. [3] To be included in this analysis, we selected all alters from the main file (consolidating cases from 1998 to 2013) with egonetworks with a size of 2 or greater. [4] Egocentric networks will only be observed to exhibit retaliations as counted in a triad census as A<->B, C if reciprocal ties exist among alters. For this reason, we counted among alters and reciprocal conflict involving the ego manually. [5] The *n* varies because some groups did not have sufficiently large egonetworks in each phase. To account for this variation, an average ratio was calculated—the average ratio looks at the average number of simple patterns per group compared to the average number of complex patterns.

4.2. Shifting Patterns of Violence

Table 4 reports several SOAMs disentangling how patterns of violence changed across phases of CGI implementation. Several notable patterns are found. First, gangs may have a long memory as new attacks are more likely to involve reciprocated violence. (Recall that each observation captures 4 years of conflict: this means that a gang member's murder in T_1 could be reciprocated with a murderous attack on the aggressor more than four years later). The baseline model also shows that tie changes are not likely to form transitive triplets (significant negative effect for transitive triplets), except among gangs with CGIs. This means that we observe a tendency among gangs with CGIs to attack in a manner that generates a transitive triplet with another CGI restricted gang (the effect remains significant across subsequent models). In other words, gangs with CGIs exhibit a tendency to form three-way conflicts with other enjoined gangs. Further, although initially important, the probability that a new attack generates balance (where gangs exhibit a tendency to attack others that they are structurally similar to, meaning they also attack the same alters) weakens with the introduction of gang attributes. Meaning, when we control for group characteristics differential social status emerges—some groups have more competitive advantage. Interestingly, whether a focal gang or its combatant has a CGI does not account for tie formation or dissolution, instead, popularity is the most significant factor. Gangs suffering a lot of attacks in an initial observation will suffer more in subsequent observation. Gangs who attack a lot, are less likely to be attacked in a subsequent observation (outdegree popularity), suggesting that overt aggression may ward off attack. Notably, while change is significant across all models, the rate of change from assent (T_2) to maturity (T_3) is the greatest.

Table 4. SAOM Investigation of Structural Complexity (* $p < 0.05$).

Factors	Baseline		Transitivity Dissection		Actor Attributes		Full Model		Parsimony	
	β	S.E.	β	S.E.	β	S.E.	β	S.E.	β	S.E.
Structural										
Reciprocity	−1.849 *	0.761	−0.355	0.445	5.997 *	1.182	3.827 *	0.369	5.540 *	1.836
Trans. triplets	−2.917 *	0.819								
CGI Trans. triplets	2.212 *	0.872	0.737	0.361	4.491 *	0.836	2.478 *	0.664	4.079 *	0.997
Trans. mediated triplets			−0.94	1.086			1.032	0.618		
Trans. reciprocated triplets			1.682	2.684			−0.798	2.492		
3-cycles			1.120	1.222			2.346	1.621		
Balance			0.488 *	0.065			0.214 *	0.099	0.118	0.168
Betweenness (control)			−2.488 *	0.310			−0.187	0.334		

Table 4. *Cont.*

Factors	Baseline		Transitivity Dissection		Actor Attributes		Full Model		Parsimony	
	β	S.E.	β	S.E.	β	S.E.	β	S.E.	β	S.E.
Actor Attributes										
Indegree-popularity					0.045 *	0.017	0.025 *	0.009	0.045 *	0.019
Outdegree-popularity					−4.734 *	1.078	−2.839 *	0.328	−4.328 *	1.506
CGI alter					−0.229	0.480				
CGI ego					−0.5036	0.664				
CGI similarity					−0.7984	0.488				
Rate of Change										
Period 1, T_1 to T_2	0.881 *	0.054	1.128 *	0.075	0.952 *	0.0605	0.945 *	0.058	0.955 *	0.061
Period 2, T_2 to T_3	1.056 *	0.059	1.534 *	0.105	1.168 *	0.0718	1.183 *	0.071	1.176 *	0.077
Period 3, T_3 to T_4	0.961 *	0.054	1.291 *	0.089	1.036 *	0.0628	1.036 *	0.066	1.043 *	0.064
Estimate Performance										
T Ratio (model convergence)	2 under 0.1		all under 0.1		all under 0.1		all under 0.1		all under 0.1	

5. Discussion

5.1. Implications

Our results suggest that the structure of gang violence changed across successive observations. While the implementation of CGIs covaried with the evolving structure of violence overall (global effect), the impact was smaller when comparing enjoined gangs to alters. Dissecting how patterns of violence changed we found that CGI gangs were more apt to attack other groups under an injunction, and that excessively aggressive groups (measured with outdegree popularity) were less likely to be victimized at a subsequent observation. These findings provide some support for the idea that targeted enforcement strategies can facilitate change in gang violence—we found that over time, as more injunctions were filed, the nature of gang conflict became more complex.

Integrating social network theory with crime opportunity theory, (Bichler 2019) argues that crime opportunity flows through a network. It is an individual's contacts and interactions with others that exposes them to crime. If we consider Papachristos' (Papachristos 2009, p. 75) conclusion to be valid, that gang members "kill because they live in a structured set of social relations in which violence works its way through a series of connected individuals", then it can be argued that variable criminal behavior, such as the use of violence, can be explained by differential positioning within the network. Aggregating to the group level, this means that the topography of social relations may explain intergroup violence, with some groups being "better" positioned to become embroiled in conflict with other groups. Taken further, changing the social landscape should alter the opportunities to fight, which should affect the level of violence observed. Applying this argument to the present study, CGIs were intended to change how gang members interact in public settings. More specifically, the stipulations included in most CGIs have the potential to reduce the visibility of enjoined gangs (prohibitions against congregating in public) which should decrease their exposure to gang-on-gang and gang-on-community interactions. As a result, violence should decline. However, this was not found.

What the architects of the original CGIs failed to appreciate was just how important inter-gang conflict is in shaping conflict networks. If opportunity has a network component, then changing the behavior, and thus, social position of one group, will trigger a ripple effect through the network, affecting other actors. To implement opportunity reducing strategies, the social network must be considered as actors do not function in isolation. For instance, exploring the social processes associated with risk of victimization, Green et al. (2017) show that gun violence spreads through a process of social contagion (63% of 11,123 episodes occurring in Chicago, 2006 to 2014), transmitted through social interactions, with alters being victimized on average 125 days after the victimization of their infector. Investigating how local patterns shape violence at the network level, Lewis and Papachristos (2020) show that complex transitive local patterns, actor characteristics, and group attributes (dominant actors) shape violence networks. Contributing to this line of inquiry, our results suggest that continued

investigations of emerging and changing structure are needed, particularly those drawing from different information sources. Comparing self-report and community observations with police records, arrests, cases prosecuted, and convictions (and appeals), helps to uncover how criminal justice filtration processes and social interactions (intimidation of witnesses) influence the nature of networks generated.

5.2. Reducing Gang Violence

Apart from (Bichler et al. [2017] 2019), the structure of conflict pre- and post-injunction has not previously been investigated for a community of actors. The limitation of (Bichler et al. [2017] 2019) is their focus on only Bloods and Crips. In the present study we sought to add to the literature by extending the boundaries of the community. Though principally limited to capturing Hispanic and African American street gangs operating in the City of Los Angeles, this study enriches our understanding of the structure of intergroup conflict. Moving forward, subsequent research should consider how gang attributes contribute to shaping the social landscape of gang relations. To bolster the effect of focused deterrent strategies like CGIs, we need to incorporate control variables and other rival causal factors to better account for shifting structure and the imbalance between groups that may reflect positions of competitive dominance. Reviewing recent findings, three explanatory variables are beginning to emerge: (1) *group dynamics* as reflected in membership or size of territory controlled (Brantingham et al. 2019), internal cohesion (Ouellet et al. 2019), and race/ethnic homophily (e.g., Gravel et al. 2018; Papachristos et al. 2013); (2) *intersecting aspects of geographic and social connectivity* as evident in the spatial distribution of gang violence (Tita and Radil 2011); and (3) *internet banging* that generates links between web-based provocations (posts that advance gang objectives, promote reputation, and disrespect other gangs) and physical violence (e.g., Décary-Hétu and Morselli 2011; Dmello and Bichler 2020; Moule et al. 2014). By understanding the explanatory power of these factors, future research can continue to improve targeted crime control strategies.

5.3. Limitations

We acknowledge several potential limitations to this study. First, we must consider the data source—this study drew from prosecuted cases generating appeals. Appeal cases typically involve the most serious and violent incidents, which does not capture the full range of gang violence—recall that 77% of the cases investigated in this study involve murder or attempted murder. The LAPD reported that 3390 gang-related homicides occurred during the study period, and that approximately 51% were cleared with arrest, and not all cases went to trial (Los Angeles Police Department 2017, 2020; Snibbe 2018). Comparing study cases to reported clearance rates, we estimate that the sample includes at least 34% of cleared gang homicides. Though limited in scope, the types of incidents captured in these cases are the forms of violence CGIs are meant to deter. Understanding the structure emerging from these cases provides a glimpse into how CGIs are impacting behaviors stemming from the most serious forms of gang violence. As CGIs are rooted in problem-based prosecutorial strategies, compiling information from 198 case studies is a reasonable effort to generate direction for continued exploration and development of court-based crime control strategies.

In addition, this study offers a point of comparison to Lewis and Papachristos (2020) who used violence known to police—incidents known to police constitute a measure of crime situated at the opposite end of the criminal justice information continuum to what we investigated. Comparing our results to their study raises questions about which kinds of incidents filter out as cases move through the system. For instance, are direct acts of retaliation less likely to result in a successful prosecution? Further, to what extent does victim or witness cooperation impact case movement through the system? To date, network science has yet to explore how criminal procedures and case characteristics filter cases, affecting the nature of relations identified at the dyadic level, as well as the network structures that emerge when conflict is mapped as a social network. The insight gained from such investigation could inform prosecutorial efforts to enhance social justice.

Second, gang identities were not always well documented in the data, thereby generating a coding issue. For example, individuals may have been listed as gang members without identifying the specific gang they belonged to. Further, naming conventions were not consistent across cases. For instance, within the cases being coded as involving members of the 83 Gangster Crips, gang affiliations were identified at trial by different names—Eight Tray Crips, Westside Eight Tray, and 8 Tray Gangsters. This inconstancy in naming made it harder to identify which gang defendants and victims belonged to. In addition, while individual association with the larger parent gang may have been recorded, clique or subset information was missing. Large gangs are known to have identifiable subgroups. These subgroups include people who co-offend together. Since some gangs are reported to have upwards of a thousand members, understanding violent interactions involving subgroups may result in more effective counter measures. The extensive, labor-intensive cleaning protocol developed to deal with these issues lead us to strongly suggest that a greater effort should be made to be consistent when describing gangs and gang associations during investigations and trials. Meanwhile, these issues with naming conventions afflict all gang research, and thus, our results are comparable to the current literature.

Finally, the directionality of conflict may be arbitrary in some cases. In cases where the victim is an innocent bystander, directionality is clear (there is a clear victim and aggressor). However, when gangs are being equally aggressive, directionality is not as straightforward. For example, in cases where you cannot determine who the aggressor in the situation is, the survivor of a conflict is often associated with being the defendant while and individual who is fatally wounded is associated with being the victim. Yet, this designation does not necessarily capture the true nature of the conflict. Subsequent analysis should consider non-directed intergang violence. By reconfiguring how relational information is used to generate the conflict networks, we can conduct sensitivity analysis to test the robustness of findings given described data limitations.

6. Conclusions

The fatal consequences of street gang violence extend beyond the identified combatants, spreading into the fabric of a community by involving individuals with no known gang association. Adopting a social network approach to this investigation, we describe the long-term effects that a dedicated CGI program has on the structure of gang conflict originating from the City of Los Angeles. While the prolonged use of CGIs by different city attorneys is associated with some pronounced, albeit potentially short-term, reductions in crime, our findings suggest that while crime at the community level may decline, the structure of conflict thickens, becoming more complex and embedded, though more so for some gangs than others. Moreover, CGI implementation patterns have cumulative effects. Continued effort is needed to develop strategies that will disentangle the web of violence that continues to plague communities.

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Article

Making Sense of Murder: The Reality versus the Realness of Gang Homicides in Two Contexts

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Abstract: Despite the proliferation of research examining gang violence, little is known about how gang members experience, make sense of, and respond to peer fatalities. Drawing from two ethnographies in the Netherlands and Canada, this paper interrogates how gang members experience their affiliates' murder in different street milieus. We describe how gang members in both studies made sense of and navigated their affiliates' murder(s) by conducting pseudo-homicide investigations, being hypervigilant, and attributing blameworthiness to the victim. We then demonstrate that while the Netherland's milder street culture amplifies the significance of homicide, signals the authenticity of gang life, and reaffirms or tests group commitment, frequent and normalized gun violence in Canada has desensitized gang-involved men to murder, created a communal and perpetual state of insecurity, and eroded group cohesion. Lastly, we compare the 'realness' of gang homicide in The Hague with the 'reality' of lethal violence in Toronto, drawing attention to the importance of the 'local' in making sense of murder and contrasting participants' narratives of interpretation.

Keywords: gang homicide; comparative research; ethnography; gang violence

1. Introduction

Scholars have argued that violence is fundamental to gang life (Klein and Maxson 1989), "so that membership may have a seductively glorious, rather than mundane, indifferent, significance" (Katz 1988, p. 128). The epitome of gang violence is gang homicide, which many academics, police officials, and policy markers consider a *unique* and *distinct* type of murder[1] (Maxson et al. 1985; Maxson and Klein 1996; Maxson 1999). Despite academic, political, and public preoccupation with gang homicides, questions remain about how to define, classify, measure, and study these murders. For example, while some classifications include homicides that are allegedly gang *related* (where the victim and/or offender are gang members), others necessitate the homicide be *motivated* by gang functions (for the explicit benefit of the group) (Maxson and Klein 1990, 1996). Scholars also disagree about the necessary motivations for gang homicides, which can be further delineated by expressive (signaling gang power), instrumental (i.e., protecting gang turf) motifs, or both (Decker 1996; Decker and Pyrooz 2013). Importantly, data on 'gangs' and, by extension, on 'gang homicides' are predominantly police generated, and can therefore be riddled with methodological limitations[2] (see Esbensen et al. 2001; Skogan 1974). These distinctions and data are consequential as they affect how we *quantify* gang homicides (and therefore fashion

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1 Gang homicides are more likely to include multiple offenders, to occur in public settings, to have different spatial characteristics, to involve younger persons, and to involve strangers than nongang incidents (Curry and Spergel 1988; Decker and Curry 2002; Howell 1999; Maxson et al. 1985; Pizarro and McGloin 2006; Pyrooz 2012).

2 Criminologists disagree on this. For example, Decker and Pyrooz (2010, p. 370) argue "contrary to many claims, police reports of gang crime are not fraught with measurement error so as to be unsuitable for meaningful analysis".

policies/responses), how well our classifications resemble *the realities* of gang homicide (including motivations), and how we understand the *micro processes* of gang homicide.

Though no robust predictors of gang homicide exist, several factors can propel its occurrence. Locality can be central to inciting and shaping gang violence, given many gangs' commitments to specific blocks or territories (Aldridge et al. 2011; Brotherton and Barrios 2004; Spergel 1984). Often, gang turf and territory is located within the neighbourhoods in which gangs form and operate, with neighbourhoods providing the sole or primary space for income generation, particularly in relation to drug trafficking (Hagedorn 1994; Papachristos et al. 2013). Therefore, gang violence, including lethal violence, is often related to 'defending' a neighbourhood, showing 'love' for the community, and competition over territory, status, resources, and drug markets (Brotherton and Barrios 2004; Decker 1996; Densley 2012; Hagedorn and Macon 1988; Maxson 1999; Rodgers 2002; Vargas 2014). Given that drug trafficking is a central illegal enterprise for many gangs and drug trafficking escalates risks of victimization and violent offending, gang homicides are often connected to the drug trade (Adams and Pizarro 2014; Blumstein 1995; Curtis 2003; Densley 2014, p. 52). Moreover, the illegality of drug trafficking prevents traffickers from relying upon prosocial governance institutions to facilitate exchange and provide redress for disputes (see Skarbek 2011), necessitating that they take matters into their own hands, sometimes via lethal violence (Adams and Pizarro 2014).

Gang homicide—similar to gang violence more broadly—is not randomly distributed across physical space, but often ensues in gang "hot spots," frequently located in/near marginalized communities characterized by concentrated poverty and where formal social control actors are absent or inadequate (Bursik and Grasmick 1993; Curry and Spergel 1988; Kubrin and Wadsworth 2003; Mares 2010; Papachristos and Kirk 2006; Pizarro and McGloin 2006; Rosenfeld et al. 1999). In addition to ecological and neighbourhood conditions, other factors affect gang violence, including network processes such as a history of conflict and reciprocity of violence. It is therefore unsurprising that gang violence may be more pronounced in areas where competing gangs share an adjacent turf (Papachristos et al. 2013). Further, in such areas, victims/witnesses may be unwilling to cooperate with law enforcement due to distrust in police and strained police–community relationships, an adherence to "street codes" (Anderson 1999) which privilege street justice over police interventions, and/or due to intimidation and silencing (Miethe and McCorkle 2002). This can mask the prevalence and nature of gang violence from neighbourhood 'outsiders' (such as police) and can make preventing, investigating, and prosecuting gang homicides exceptionally difficult. Gang violence/homicide prosecutions can be further complicated by other elements, including multiple victims/offenders, challenges in establishing gang membership in court, and proving the violence was 'gang motivated'. In response, some jurisdictions in the United States have created dedicated gang units and specialized prosecutions to aid the capture and prosecution of those suspected to be involved in gang violence (see Pyrooz et al. 2011; Miethe and McCorkle 2002).

What is particularly notable about gang homicide is its often cyclical and reciprocal nature. Much gang conflict is therefore both a *consequence of* and *precursor to* gang violence (Decker 1996). Retaliatory homicides are often connected to and/or direct products of operative "street codes" which, in addition to discouraging cooperation with law enforcement mandate that 'disrespect' is met with violence or it may propel additional victimization[3] (Anderson 1999; Kubrin and Weitzer 2003, p. 158). As such, retaliatory violence can be a response to competition, an effort to incite social control, to seek "street justice", and to hamper future victimization (Jacobs and Wright 2006; Kubrin and Weitzer 2003; Maxson 1999). The extent to which gangs retaliate for affiliate homicides is unclear; one study found that 37% of homicides in Chicago amongst organized street gangs were reciprocated (Papachristos 2009). However, some scholars posit gang retaliations are not always

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[3] See (Urbanik et al. 2017) for a discussion of how street codes can also limit violence.

targeted at the provoking group but may entail "generalized reciprocity," where the performative aspect of retaliation is directed against a different gang (Lewis and Papachristos 2020).

Recently, gang scholars have become particularly attuned to examining whether and how technology affects gang violence and/or homicide. Though Miller (1975) seminal work on gang violence examined how technological advances such as cars and handguns may have driven the popularity of drive-by shootings, contemporary research has shifted its gaze to the expansion of the Internet and social media. Scholars studying social media and criminally-involved groups have begun to examine the role that social may play in inciting or repelling gang violence and homicide (see Urbanik et al. 2020 for a review).

2. Current Study

The proliferation of studies on gang violence has illuminated many facets of this phenomena. However, the bulk of research on gang homicides has examined the *emergence* of gang violence and its consequences, including retaliation. Consequently, we know little about the *residual* effects of gang homicide, particularly how they affect surviving gang members and their respective groups. In this paper, we examine how gang murders affect affiliates, focusing on how they experience, make sense of, and to respond to peer fatality. By drawing from ethnographic research in two countries—the Netherlands and Canada—we unmask how street cultures and milieu's affect experiences of gang homicides and respond to calls for comparative and multisite gang research (Klein 2005). We first describe our field sites and the role of gang homicide in our respective studies.[4] Second, we highlight the *commonalities* in how gang members make sense of peer murder and discuss the *divergent* residual effects of these instances. We then center 'the local' (Fine 2010) in documenting how participants' varying local contexts and lived realities impacted how they perceived, experienced, and responded to peer fatality.

3. Study A: The Forgotten Village, The Hague (The Netherlands)

Between 2011 and 2013, Roks conducted fieldwork in a small neighbourhood—known as the Forgotten Village—in the city of The Hague, Netherlands, which served as the home base of the Dutch Crips since the late 1980s, who refer to it as their "h200d" (Roks 2017b). Whilst Roks conducted semi-structured interviews, informal conversations, and ethnographic observation with many local residents and stakeholders, he spent most of his time with current and former members of the Dutch Crips. At the onset of the research, the Dutch Rollin 200 Crips consisted of some 50 members (15–40 years old), predominantly of Surinamese and Antillean background. Local and national media have heavily documented the Dutch Crips, including with a 90 min documentary, titled 'Strapped 'N Strong' (Van der Valk 2009). In media interviews, Crips members have consistently referenced their familiarity and experiences with violence and murder and their propensity to use violence when necessary. For example, during one interview with the Dutch magazine *Panorama*, Raymond—the gang's leader—expressed: *"If I want you dead tomorrow, then you'll be dead tomorrow. If I want you to die in one year, you'll be dead in a year"* (Viering 1994, p. 41).

Although violence was central to the Dutch Crips' presentation of self in the media, actual levels of (gang) violence in the Netherlands are low, consistent with many other European nations. An analysis of gangs in different countries by Klein et al. (2006, p. 41) indicates that both the patterns of violent behaviour and the levels of violence of European gangs are less serious than in the United States. Klein et al. (2006) attribute these differences to the nature of gangs in Europe, the lower prevalence of firearms, and lesser levels of gang territoriality. In the Dutch context, Ganpat and Liem (2012, p. 329) show that between 1992 and 2009, 223 persons were murdered annually on average, usually precipitated by arguments and domestic disputes. 'Criminal' homicides comprised 12% of all cases, with incidents varying from "drug addicts killing one another, drug users who killed dealers, and dealers who killed one another during a bad deal" (Ganpat and Liem 2012, p. 333),

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[4] For an extensive overview of both ethnographies, see (Urbanik and Roks 2020).

though none were classified as gang related. The Netherlands' homicide rate has been declining since 2009, with 119 murders in 2018 (CBS 2020), 34 of which were due to gun violence, and an addition 577 incidents involved firearms (RTL Nieuws 2020).

During Roks's fieldwork, one of his participants was murdered. In the late hours of Sunday, August 19th, 2012, Quincy "Sin" Soetosenojo[5] was shot several times at close range in his hometown of Amsterdam. He succumbed to his injuries and passed away in the hospital later that night. The murder remains unsolved, making it impossible to assess whether this incident could be classified as a gang homicide. Sin's murder was one of 157 murders in 2012, translating into a homicide rate of 0.94 per 100,000 inhabitants (CBS 2017).

4. Study B: Regent Park, Toronto (Canada)

Urbanik's research is situated in a neighbourhood just east of Toronto's downtown core, Regent Park. Until its ongoing revitalization, Regent Park was Canada's oldest and largest social housing project, and the neighbourhood amassed a notorious reputation as a space of concentrated, racialized poverty and violence. Between 2013 and 2018, Urbanik conducted ethnographic observation and interviews in the neighbourhood. She spent most of her time "deep hanging out" (Geertz 1998) with approximately 25 gang-involved men, who loosely belonged to two neighbourhood gangs, The Rich Riderz and The Young Soldiers (see Urbanik 2018).[6] Despite engaging in several aspects of "gang life" including repping, drug trafficking, turf wars, robberies, gun violence, and gang homicides, these groups were more fluid and loosely organized than larger and more traditional gangs, and had fewer expectations about group commitments. Gun and gang violence are an unfortunate lived reality for many Regent Parkers, and for Urbanik's participants in particular, all of whom reported losing friends, affiliates and family members to gun violence. During the study, many of Urbanik's participants were shot (at) and several were killed.

Similar to the Netherlands, Canada's homicide rate pales in comparison to that of the United States, in part due to stricter gun control. In 2018, Canada reported 651 homicides, and a homicide rate of 1.76 per 100,000 inhabitants. Approximately one-quarter of homicides were classified as "gang related," 83% of which involved a firearm (Statistics Canada 2019). Toronto—Canada's most populous census metropolitan area (CMA)—reported the most homicides of all CMAs, with 142 victims, a 53% increase[7] from the year prior, and a record number since data collection began (Statistics Canada 2019). Thirty-six of these homicides were classified as "gang related". Gun violence is also a growing concern, with many Torontonians—including the former Police Chief—blaming gangs for the shootings (Global News 2019) and news media characterizing the City's gun violence as "civil war" (Warmington 2020). Much of this violence is related to inter-neighbourhood 'beefs', which are particularly common amongst Toronto's social housing projects (see also Berardi 2018).

5. Making Sense of Murder

Despite notable differences in street and gang milieus and the frequency of gang homicide across our field sites, our findings unmask several commonalities in how gang members experienced and responded to peer fatality. We first describe how gang members in both studies tried to make sense of and navigate their affiliates' murder by conducting pseudo-investigations, being hypervigilant, and attributing blameworthiness to the victim.

"What happened, and who did it?": Pseudo-Investigations

Three days after Sin was shot and killed, Roks met with several Crips members who spent most of the evening discussing and debating the circumstances surrounding his murder. The men's occupation with discussing Sin's potential killers and their motives

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[5] Except for Quincy "Sin" Soetosenojo, all names are pseudonyms. Some details have been altered to protect participants' identities.

[6] Upon comparing field experiences with Roks, Urbanik returned to the field and conducted "problem-centered interviews" (Witzel 2000), specifically focused on how participants experienced and navigated peer fatality.

[7] Though 2018 was an unusual year given high-causality events, there was still an increase.

superseded traditional mourning rituals. Roks was struck by how meticulously the men conducted their pseudo-investigation. Mirroring the methods used by law enforcement officials, they spoke to Sin's friends and acquaintances about whom he had spent time with recently and whether he had any ongoing beefs or problems that they may be unaware of. As both a member of the Crips' chapter in Amsterdam and The Hague, and because he recently joined a Dutch outlaw motorcycle gang, Sin moved in different circles. This prompted the Crips to amass a long list of possible suspects and motives, deploying even the slightest sliver of information to construct suspicions and allegations.

The Crips also collected and fastidiously reviewed eyewitness reports and crime scene photos published by local media to reconstruct Sin's murder and hopefully identify the culprit(s). For example, they drew upon the arrangement of parked cars and the proximity to Sin's home to the crime street to determine that Sin likely knew his killer. The blood stains in the crime scene photos suggested that Sin was walking away from his vehicle when he was ambushed, reaffirming their hypothesis that an acquaintance must have called him over. They also deliberated about eyewitness' media descriptions that the gunfire sounded like 'rattling' to deduce the murder weapon. Crips' founder Raymond was particularly fixated on this, asserting that identifying the gun and bullets could narrow the suspect list and allow them to gauge if other Crips were in danger.

In an environment such as Regent Park, news about homicides and information about suspected shooter(s) and potential motives travels with exceptional velocity. Similar to StudyA, the men dedicated the immediate aftermath after someone was shot (fatally or otherwise) to trying to determine what happened and most importantly, who was responsible. To illustrate, one summer afternoon in 2015, several of Urbanik's participants were playing cards on the boardwalk when they were ambushed by a drive-by shooter. Approximately 30 min later,[8] Urbanik arrived at the scene to find police had taped off the area, and some of her other participants[9] and other local residents were already recounting what happened, exchanging intel on the shooter and driver's physical description, analyzing the car's route, and listing recent neighbourhood 'beefs' to determine possible motives, to determine the shooter's identity.[10] Once they were 'certain' who the shooter was and his motive (less than an hour later)[11], they called and text others to warn them and to elicit information on his whereabouts.

The speed with which the men in Regent Park conduct pseudo-investigations post-shootings and homicides and try to determine the possible culprit(s) even surprised them, as Rehan highlighted: "*Pretty quick! So quick, it's crazy- though. Like, even I thought about it a couple times. Like, how did you get this information-that's going down? . . . Like, the same day. Like, sometimes before it hits the news, you know?*" One afternoon in 2018, a few weeks after a prominent neighbourhood rapper and his affiliate were shot and killed, Matteo—who has lost 12 close friends to gun violence—shared his internal monologue upon learning another loved one was murdered: "*Makes you think like, what the fuck? What happened? What did he do? And where the fuck was he going and where did he end up?*" Overhearing this, Ezekiel chimed in: "*And if it's somebody close, the thought that comes through your head is "Fuck, I could have been with that nigga. That could have been me!*" When an affiliate was killed, Urbanik's participants' proximity to the deceased (re)sensitized them to the fact that they may be next. Consequently, meticulously gathering homicide details and any related knowledge is "*not for them to solve the crime or anything*"—as Asad asserted, but is motivated by a need to uncover what happened which can shape their response (and specifically, retaliation), and can aid in deflecting subsequent victimization. Determining a peer's last moments and more importantly "*who you was running with?*" is an important survival tactic that can

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8 Urbanik was in a local community center when the shooting occurred.

9 Those targeted immediately left the area to stay safe and avoid police interaction.

10 In instances where no eye-witnesses were available, Urbanik's participants had to gather information through other sources, including: social media posts, news media accounts, and details provided by friends and family.

11 While this strategy can result in fatal misunderstandings and errors, it is nevertheless a critical component of neighbourhood life post-shooting.

help protect members. However, since Urbanik's participants, similar to the Dutch Crips, associated with different groups, identifying the culprit could be challenging.

"Before you know it, you are shaking hands with his killer": Hypervigilance

In the days following Sin's murder, suspicion and distrust–signs of fear according to van de Port (2001, pp. 109–19)–dominated Crips' conversations. Concerns about whether the killer walks among them even made it to the media; Raymond remarked to a journalist who attended Sin's wake: "*Everyone is offering their condolences. Before you know it, you are shaking hands with his killer*" (Van Stapele 2012). When Roks spoke to Dre, a younger Crips member, Dre was upset with his comrades for drinking alcohol and criticized their alleged lack of vigilance during such a critical time. Though Dre noted that several officers attended the wake in hopes of gathering intelligence, he nevertheless affirmed his own commitment to protection: "*But I had the heat on my balls!*", indicating he carried a gun to the wake.

During this time, Roks's participants were in a "*hidden state of emergency*" (Green 1994, p. 228). Although many members prided themselves on being 'strapped 24/7', they appeared to increase their armament following the murder. Every night that following week, they hid a weapon (e.g., baseball bat, firearm) nearby, something they never did during the previous 20 months of fieldwork. It also seemed like the younger members of the Crips were more vigilant in the h200d, paying extra attention to unknown others. They watched passers-by closely, followed them for several blocks, and sometimes even demanded they remove their hands from their pockets when walking through the neighbourhood.

One week after Sin's death, Raymond summoned almost all the Crips to meet him in the h200d before they travelled together to a nearby forest. Prior to leaving, Raymond demanded they all turn off their cellphones and remove the battery to prevent police monitoring. Once in the forest, the men gathered in a semi-circle with Raymond at the center. He started the meeting with "*a moment of silence for the dead homie*" and following the reflection, asked the others how they felt. When no one responded, he reiterated the question, which implored the others to respond with: "*Angry*", "*Fucked up*", and "*It's dark over here, cuzz*". Quincy, a younger member and Sin's close friend, expressed his rage and desire to retaliate. Raymond sympathized and admitted he also wanted revenge, though he cautioned that they had to keep their emotions in check until they were certain of the killer's identity. Raymond then recounted the information he gathered during that week and shared his suspicions about who may have more knowledge and who may have been responsible.

A few days after the gathering, Sin was to be buried in Amsterdam. Before the funeral, Raymond asked: "*Roks, do you want to come*? *Just so you know, it is in the middle of enemy territory*". The day of the funeral, temperatures were projected to reach over 30 °C. When Roks arrived in the h200d, he met with Marvin, a Crip member since the mid-1990s. After exchanging a quick hug, Marvin asked Roks whether it was obvious he was carrying a gun under his clothes. He pondered whether he should wear his coat, worried that donning a jacket on such a hot day might betray to police or others at the funeral that he was armed. Roks assured him that his oversized T-shirt concealed the gun well, which pleased Marvin. This exchange made him more cognizant of how other Crips dressed for the funeral, and he noted that most wore baggy and oversized clothing, including jackets.

In StudyB, murders initiated an almost identical series of events; news/information travelled quickly, police saturated the neighbourhood, and Urbanik's participants usually retreated indoors to determine what happened, their own risk levels, and whether/how they should respond. See how Leon described the group's reactions upon finding out an affiliate was killed:

> "*Anger! 'Let's go right now! like where's he [killer] at, who did it?' . . . Everything is going through your head, you know? How you lost someone that's really close to you, right? . . . There's too much anger, you want to do anything just, you know? So they [killers] can know how you feel the pain, right? And you ain't gonna heal nothing, it's just—you get at them [retaliate]*".

A few days after a young affiliate was shot and killed one summer, Urbanik and another researcher[12] pulled up to the apartment which served as her participants' home base. The area was eerily quiet which was unusual given its vivacious drug trade. Urbanik text Booker—one of her key participants—that they arrived and he came downstairs with Matteo shortly thereafter. Both men appeared uneasy, looking around frequently, studying passing cars carefully, and staying close to the building entryway—atypical behaviours since they were usually relaxed in that area. When Urbanik asked why it was so deserted, Booker responded: "*We're all laying low at Ricky's house. I told em you guys are here, they said they might come down later. Things are hot right now*" Urbanik then probed whether it was related to the shooting, he responded: "*Yea. This shit got us fucked up. Just trying to figure out whose who and the next play* [response], *you know? I'd invite ya'll up but trust me- you don't wanna be part of this right now*".

Following a peer's murder, Urbanik's participants operated in a state of hypervigilance until they could identify the killer(s) and motive, wary of being outdoors and which group members they spent time with. Matteo described their trepidation upon learning another peer was killed:

> "*You think you're next. Just cause it's your community that they're dropping close by, right? . . . This shit is happening in your backyard. And to find out you don't know who the fuck the killer is? What if I'm chillin' amongst the killer, and he's just planning on the next one? Like, that's what gets me triggered!*"

Concerns that the killer may be a close affiliate with intimate knowledge about the men's routines and potentially "*planning on the next one*" pushed them to withdraw from neighbourhood life and some group members until things settled. Frankie explained why they rarely ventured outdoors until they had had more information: "*I'm out numbered, I'm out numbered, I can't come outside . . . you don't know who's after who*". Once the men narrowed down or identified possible culprits (usually within a week) and eliminated their affiliates from the suspect list, they re-established their neighbourhood presence. However, the possibility of future ambushes meant they usually only ventured outdoors in large groups and only if at least one person was armed in the weeks following a homicide.

Whilst Urbanik's participants considered strength in numbers a safety measure, they acknowledged that they had to remain hyperaware of their surroundings. Booker described the need to be exceptionally cautious following a peer's murder: "*You just gotta be on your P's and Q's more. It makes you paranoid a little bit . . . got you looking around more often, over your shoulders. You never know. Anything can be expected, right*?" Being on your "Ps and Qs" refers to being "on point", a concept whereby streetwise residents must be hypervigilant, recognizing and mitigating the dangers of their surroundings to thwart violent victimization (Berardi 2018, pp. 120–23). Though Urbanik's participants always had to be circumspect within and beyond Regent Park, peer fatalities amplified their attentiveness in the short term. For example, when discussing one of Urbanik's key participants'—Nathaniel's—murder in 2016, Asther insisted that although he is "*always aware*" given where he lives and his lifestyle, Nathaniel's murder intensified his wariness: "*I'm saying that made me extra cautious, what happened to Nathanial, right?*"

When a group member was killed (and especially after the men retaliated), Urbanik's participants were intensely committed to surveilling the neighbourhood to protect residents and themselves from subsequent violence. To illustrate, consider Marcel's response when Urbanik asked how the group's behaviours change when the "*hood is hot*":

> "*People would see fishy vehicles, or, fishy people, you know what I mean, and from there, you'd get that sense- like you'd know. We all know everyone from Regent Park. I know everyone who has braids in Regent Park. Someone walks around with braids I don't know? I'll be like 'Look at this guy!' And they would do the same thing . . . Altima, tinted, moving funny, driving funny. And we'll just stand on our toes.*"

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12 The researcher was a co-investigator on a separate ongoing study.

Urbanik's participants deployed other safety protocols during times of heightened risk. For example, they sometimes hung out in full-view of building security cameras in hopes of deterring assailants, rarely veered far from building doors and ensured doors were always open (sometimes breaking locks to ensure a speedy exit), and occasionally avoided funerals/viewings. They also paid residents in easy-access apartments/townhomes to keep their doors unlocked so they could run inside if necessary, increased group communication, and had Urbanik check around adjacent buildings/corners, run neighbourhood errands (e.g., trips to the convenience store), and drive them places.[13] Similar to Roks's study, peer fatalities in Urbanik's field site sparked a *"hidden state of emergency"* (Green 1994, p. 228), despite their troubling frequency.

"They trusted someone they shouldn't": Attributing Blame to the Victim

In comparing StudyA's and StudyB's findings, a third common response to peer murder emerges: how gang members 'make sense of' what occurred. Once the men in the Forgotten Village and in Regent Park identified the probable killer(s), they shifted their attention to the deceased's actions preceding their murder.[14]

While the men in Roks's study mourned Sin, Raymond drew upon the killing to reiterate the informal rules of Dutch gang life:

> *"That's why I always say: let me know your whereabouts. That shit can keep you alive. Let me know where you are and let me know when you've made it home. I know it sounds childish, but that shit can keep you alive. It's fucked up, but this has to be a lesson for the young homies. This is not a joke, this shit is serious. Fucked up that a homie like Sin has to be the example." (23 August 2012, excerpt from fieldnotes)*

This comment offers a window into the daily practices of the Dutch Crips and how they navigate street life. For their own safety, the men were expected to share their whereabouts with other gang members. Raymond maintained that Sin may have prevented his murder if he had adhered to this "code". The ambiguities surrounding Sin's death were obfuscated by depicting Dutch gang life as guided by clear-cut conduct rules. However, instead of seeing this specific 'code' as a concrete determinant of behaviour, the central argument put forth by Copes et al. (2013) is that "telling the code" (Wieder 1974) illustrates how Dutch gang members give meaning to the world around them, explaining their behaviour both to themselves and to others.

Similarly, while the men in Regent Park had mutual concern for each other, they ultimately regarded survival as an individual responsibility:

> *"It's like, you already know these guys are all talking what they're living . . . So, every time I tell them, "Please keep your head up, please. I want to see you tomorrow, stay safe." Everybody. Ask them. They say 'Yeah', but they're not always keeping an eye on their head. "Be safe, be safe." They don't know. Tomorrow's never promised. They be walkin home, getting smoked. It's crazy"* (Asad)

> *"They slipped up, they trusted someone they shouldn't, and guess what? Lights out!"* (Jefferson)

In this context, "keeping an eye on their head" refers to "staying on your Ps and Qs," the opposite of being "caught slipping" (see Berardi 2018, pp. 123–37). The men's careful dissection of the deceased's alleged role in their own demise betrays that they perceive and convey gang homicides are preventable, if potential victims operate accordingly. The upshot here is that by being "caught slipping" and not successfully evading victimization (including unprovoked, unanticipated violence), Urbanik's participants regarded being murdered as a choice: *"They picked their own poison. They choose to go out* [die] *when the fuck*

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13   As a white woman, Urbanik was unlikely to be targeted in the neighbourhood.

14   Though this emphasis was often on the moments immediately before the killing (e.g., who they were with), this could also include earlier actions (e.g., behaviors 'inviting' victimization, like filming a rap video on a rival block).

they chose to went out. If I told you to do something, and you went and did opposite and you end up dying, I'll feel like, 'fucking dumb mofucker. You should have listened to me'".

Though Booker's reflection appears insensitive, it is rooted in his familiarity with death and victimization as chronic exposure to neighbourhood violence can result in suppression of sadness (see [Fowler et al. 2009](#)). When Urbanik asked whether the circumstances surrounding a murder (e.g., wrong place at the wrong time, or provoked retaliation) affected the extent to which the victim was considered responsible for their untimely death, Booker insisted: *"You still have to be on the P's and Q's about your own actions, right? So, it doesn't really matter on what they*[rivals] *did. It's how they*[victim] *went about it and how they got caught slipping . . . you were supposed to be more alert . . . "* The men also used these expectations to disparage and police others' behaviour, scolding those they believed were too content. Frankie did this often, and he was firm in his position when he described a peer being murdered because of their alleged slip in vigilance: *"I'm gonna miss you, yea. You're my boy. But everybody has to use their head. You gotta get up and look, it's like crossing the street . . . I don't mind you smoking and taking a nap but get up once in a while and check* [for rivals]". Through monitoring and condemning each other's actions, Roks's and Urbanik's participants simultaneously expressed concern for their comrades and propelled expectations that their affiliates were responsible for their own safety.[15]

6. Residual Effects: The "Realness" and "Reality" of Gang Homicide

In the previous section, we described commonalities in how gang members reacted to and 'made sense of' peer fatalities. Although the men in both studies adopted similar strategies, our data also reveal notable differences in responses to peer murder. We outline these differences below and document how their varying street milieus produced these differential effects.

"The homie is dead man, please keep it real!": The Transformative Realness of Sin's murder

One evening about two weeks after Sin's homicide, a couple of Crips members were assigned to conduct "h200d patrol"—where members position themselves around neighbourhood entry points to 'guard' and 'protect' the h200d and senior gang members—from potential enemies ([Roks 2017a](#)). Though Sin's death initially heightened caution (sometimes bordering on paranoia), members' hypervigilance and increased safety concerns within the h200d quickly dissipated. For example, when none of the members assigned to h200d patrol reacted when a stranger on a scooter passed a pedestrian-only area, the gang leader, annoyed by h200d patrol's disregard, scoffed: *"The homie is dead man, please keep it real!"* In this case, "keeping it real" referred to representing and defending Crips' 'turf.' This 'strip of reality' ([Appadurai 1996](#), p. 35)—since many gangs engage in defensive localism ([Adamson 2000](#))—forms a base 'out of which scripts can be formed of imagined lives'. However, the transformative realness of Sin's murder produced different interpretative schemes. From the perspective of the gang leader and more established members—including long-term associates since the late 1980s—claiming a hood and defending their territory is something 'real gangstas' do ([Lauger 2012](#)), particularly in the aftermath of peer fatality. However, this was incongruent with how younger and new Crips perceived Sin's murder and 'the need for' h200d patrol. Since nothing 'went down' in the weeks after Sin's death, this signaled that the h200d was losing its 'hood' status and had become an unexciting place. For these members, Sin's murder did not reaffirm the 'realness' of Dutch gang life but planted doubts about the function and necessity of defending a hood.

In his pioneering work on gangs, [Thrasher \[1927\]](#) ([Thrasher \[1927\] 1964](#), p. 46) posits conflicts with invisible or imagined adversaries can aid in gang integration: an "integration through conflict". After Sin's death, a similar process occurred as the event amplified several intra-group conflicts, mostly relating to a growing disillusion with Dutch gang

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15   This was particularly true given broad distrust in police and perceptions of their ineffectiveness, with many participants attempting to protect themselves in a milieu of police racism, brutality, and corruption.

life. Starting some months before Sin's murder, the gang's composition changed drastically; several previously-dedicated Crips lost interest in the group and left and younger members were increasingly frustrated about their inadequate compensation for their work for the Crips, which they saw as outweighing benefits of gang membership (Roks 2017b). Dwindling membership dominated conversations, almost always against the backdrop of Sin's murder. Rick, one of the OGs, spoke for many of the older members when he made sense of the Crips' waning:

> *"After Sin was killed, the shit became too real for them. Then they couldn't bang anymore, because they suddenly had a job or something. But you know, the police also knows this. That's why they see us as the core members. But many have left, man." (20 December 2012, conversation with Rick)*

Sin's murder was a defining moment that impacted all Crips, albeit in different ways. For example, while older members claimed that they had lost close friends to violence before and a few even asserted they *"were used to it"*, others openly shared that they cried frequently and had trouble sleeping since the homicide. For some members, Sin's murder revealed *who* and *what* was "real". In this sense, Sin's death had a "transformative magic" that brought "comic-book symbolism" to life (Katz 1988, pp. 129–31; Van Hellemont 2015, pp. 191–224), (re)affirming the "realness" of the Rollin 200 Crips. For others however, the murder ignited or cemented growing doubts about the reality—or *realness*—of belonging to a Dutch gang. Members who left reported being drawn to the gang because of their violent representations and street reputation; they had certain ideas about the *realness* of Dutch gang life, in part inspired by media accounts of the Dutch Crips and influenced by stereotypical representation of American gang life in movies, documentaries, and YouTube (rap) videos. For them, beliefs about the *realness* of Dutch gang life were shattered by the day-to-day realities, which usually consisted of spending long hours in the h200d doing nothing.

Sin's murder also had a transcendental significance for the Rollin 200 Crips. Annually, multiple social media accounts dedicate posts to commemorating Sin. For example, on the website of a recently established outlaw motorcycle gang that features prominent Dutch Crips members (Roks and Densley 2020), a page is devoted to all the *"cuzzos that we lost over the years"*, which maintains *"They will never be forgotten"*. The caption beneath Sin's picture reads "Triad in Peace Sin Locc". These digital artifacts transmute Sin's well-respected status within the gang and simultaneously, as Conquergood (1994, pp. 51–52) analysis of physical death murals for gang members attests, are "a generative source of strengthening cohesion and commitment" and activate the group's "cultural memory". In addition to these memorials, several Crip members have named their children (boys and girls) after Sin. Through these communicative and mythmaking practices, the Dutch Crips have woven Sin's murder into their gang mythology.

"Out here everyone thinks they're next": The Reality of Gang Homicide in Regent Park

Similar to others living in impoverished communities characterized by stigmatization, limited services, and neighbourhood violence (see Aspholm 2020, p. 217), peer murder was an unfortunate lived reality for Urbanik's participants and all considered it unavoidable. However, while the men were heavily traumatized by losing their first peer to gun violence (usually at 10–12 years old) they all reported becoming accustomed to affiliate murder, referring to it as *"normal"*, *"an everyday thing"* and *"just a part of life"*. The normalcy and near predictability of peer murder meant that even when Urbanik's participants sat around 'doing nothing' like the men in The Forgotten Village, they needed to remain vigilant and always be prepared to defend themselves, their crews, and their turf. Unlike Roks's participants who experienced peer fatality as signifying or demystifying the 'realness' of gang life, the materiality and 'realness' of gang life in Regent Park was never in question. Instead, Urbanik's participants conveyed that the troubling routineness of peer fatality both accustomed and benumbed them to losing loved ones. Booker succinctly described

this desensitization: "*You just get over it* [the murder] *much faster now than before . . . You lost people, after people, after people. It becomes like, you know, a common thing. When you get used to something, it's not as bad as the first time, right?*" As Asther reflected upon his best friend's murder one afternoon, Urbanik asked whether subsequent losses affected him similarly. He responded: "*No, they don't. Cause like, since that happened, it's like* [snaps fingers to denote frequency] *you get used to it . . . it's easier for me this time*". Claims about becoming habituated to murder are consistent with literature which has found youth exposed to community violence may become emotionally desensitized to it as a form of pathological adaptation and/or a coping mechanism (See Fowler et al. 2009 for a review).

This desensitization also meant that the 'effects' of peer homicide on group behaviours often abated quickly:

> "*Like* [when] *someone dies, like yesterday, yeah-we all mourning them. Just give it like a week later, people probably forget and people be all happy, laughing and doing their own thing. But when it happens again, we're back mourning them, then back to our normal life. We lose so much people that it just, it's like an everyday thing.*" (Leon)

Similarly, Stefano described that while the group is "Edgy for a couple of days" after a member's homicide they "Have to get back to life . . . This is not the 1st time- this is not gonna be the last time. It's not the 3rd time, it's the 100th time". These descriptions align with Urbanik's field observations. While the men spent the initial weeks post-murder openly mourning their loved ones and being hypervigilant, these behaviours largely dwindled thereafter. This was not because Urbanik's participants were unaffected by their peer's passing or questioned the 'realness' of gang life (like Roks's participants). They continued to commemorate them, engaging in several memorial processes including "pouring some out for the dead homies,"[16] producing commemoratory rap videos, and honouring them on social media (Urbanik Forthcoming). However, they believed they had to "get back to life" and "cool off" for survival; they needed to decompress quickly in anticipation of and preparation for subsequent murders and/or their own potential victimization.

Though the frequency of peer homicides necessitated that Urbanik's participants "get over" peer fatality quickly, their tragic regularity shaped group dynamics, creating a communal and perpetual state of insecurity. This insecurity manifest itself via pervasive beliefs members could be killed at any moment, eroding group cohesion, and (re)inciting distrust among members. Unlike Roks's participants who questioned the need to defend their turf after Sin's murder, Urbanik's participants maintained that letting their guard down even momentarily could be fatal and resigned themselves to the possibility they could be murdered next. See Leon's proclamation, for example: "*It could happen anytime. It could happen to us, you know? Me, just personally like, I just take it-it could happen to me at any time, it could happen to anybody, right?*" Marcel held a similar opinion, adding nuance based on the neighbourhood's ongoing revitalization which rendered violence less predictable and avoidable (see also Urbanik et al. 2017: "*At the end of the day, out here everyone thinks they're next, that's what it is. It's like, the fucking way they breaking the shit down, bodies are dropping. The more buildings go down, the more bodies*".

Since neighbourhood violence was always imminent, Urbanik's participants insisted that even when the neighbourhood is "quiet" and *hyper*awareness is unnecessary they must remain cautious and behave accordingly. As Ezekiel stressed: "*You gotta play your cards right. Life is a gamble, and they say it for a reason. You gotta roll the dice the right way*". Yet, Ezekiel contradicted himself immediately: "*You could just walk the street, look at someone wrong, and they just shoot you. What part of the game is that? That's not—that's crazy*". Here, a tension exists between the alleged safety provided by "playing your cards right"—not being "caught slipping"—where one's decisions can allegedly dictate survival or death, and life as a "gamble", where playing by street rules does not always shield against victimization. These perspectives are incongruent; on the one hand victimization is ascribed to individual

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16   A ritual of pouring alcohol out of freshly opened bottles on to the ground whilst reciting the names of murdered friends in a show of respect.

failures and on the other, it is credited to fatalism. This paradox likely reflects the men's attempts at feigning control in an environment where they have little (and sometimes zero) control over safety.

The nature and frequency of peer fatality in Regent Park also bred distrust between group members. While recounting his best friend's murder several years earlier, Matteo elucidated how this loss shattered his trust and reliance in his peers: *"Don't trust nobody. Cause it was his own people that he trust that killed him. And no one knows that I know* [culprit's identity]. *I don't trust a soul, I don't bring no one to where I live. I rest my head* [relax] *nowhere. I learned to distance . . . from the bullshit. I ain't trying to go*[die] *like that"*. Despite Matteo's recognition of these dangers and proclamation of pervasive distrust, he—like Urbanik's other participants—saw few possibilities of distancing "from the bullshit" and disengaging from 'the life.' He remains a staple of Regent Park's underground economy, spends his days with other members, features in rap music videos, and engages in "hood politics". Unlike Roks's participants who could and did disengage from gang life, Urbanik's participants' different street milieus and positionalities limited their ability to do the same. As such, they continued to navigate their increasingly distrustful and tumultuous relationships with group members, spending time together and operating as a cohesive unit all whilst remaining suspicious of each other:

> *"He was on a block– that was supposed to be allies . . . He thought he was ok, you know? The same allies hit him up [killed him]. So, you know . . . As much as people might be your allies, you still can't trust them, right?"* (Leon)

Having lost many peers to gun violence and having been set up and shot, Leon was chronically wary of his "allies," explaining how this eroded his trust in other group members: *"I know how to move now. I watch my surroundings. I don't chill with no one, I only chill with who you see I'm here with every day. That's it. I don't need no new friends. Friends will get you killed, they say . . . "* In Toronto's street milieu, "the violent threat and militaristic response exist in the same social circle" ([Katz 1988](), p. 218).

Many of Urbanik's participants adhered to the "friends will get you killed" mantra, echoing similar sentiments: "The streets talk. So, when you hear what happened, learn how not to move, basically, you know? Usually the best way to stay is by yourself, to yourself. Don't have anyone watching your moves and stuff" (Booker). The men went to great lengths to prevent even trusted peers from studying their habits. They kept unpredictable schedules, seldom shared their whereabouts, and rarely committed to being at a specific place at a specific time in fear that other members may set them up (see also [Goffman 2015]()). In this sense, 'everyday' community violence coupled with less common but still too frequent gang homicides produced and exacerbated chronic suspicion of group members, undermined reliance on group protection, and propelled additional violence (see also [Winton 2005]()). However, this disassociation did not push the men to become disillusioned with "the life" like Roks's participants, though they certainly questioned their peers' loyalty, by and large, they did not consider 'leaving the life', in part because they believed they had few alternatives.

7. Discussion

In this paper, we explored how gang members make sense of peer murder(s) and the residual effects of these violent events for gang members and their respective groups. Despite the nuances in our respective studies, our data reveal notable commonalities in how gang-involved men in two distinct contexts experience and respond to peer fatalities. In both The Forgotten Village and Regent Park, gang-involved men initiate pseudo-murder investigations, become hypervigilant in the immediate aftermath, and attribute blame to the victim in attempts to 'make sense' of the violence. Below, we describe additional commonalities in the how gang homicides affected our participants and their communities.

First, our data reveal that gang-involved men experience loss in complex, multidimensional ways. For the men in our respective studies, grief was a personal *and* communal

experience which produced individualized *and* collective effects, including trauma.[17] Drawing attention to gang members' lived experiences—particularly in relation to their exposure to traumatic events, such as peer fatalities—is critical given societal and media narratives which often pathologize gang members, portraying them as callous criminals. Whilst our participants were offenders, they were also victims with extensive histories of violent victimization by family members, friends, strangers, and rivals, usually commencing long before they were old enough to join "the life". Apart from their own victimization, the men also experienced *vicarious* victimization and trauma. The common unilateral focus on gang members as offenders obfuscates their experiences as simultaneously victims, dehumanizes them, masks their structural oppression, and de-contextualizes their decisions and behaviours. As Pyrooz et al. (2014, p. 321) highlight: "This disjuncture has done a disservice to criminology in general and gang research in particular for understanding the linkages between these concepts".

Second, gang homicides in both studies had immense collateral consequences that extended beyond victims, perpetrators, and other gang members, deeply impacting families, loved ones, and communities. As evidenced, peer homicides had the *potential to* (e.g., in The Forgotten Village) or *did* (e.g., in Regent Park) drive the cycle of victimization, affecting inter-gang relations, retaliatory violence, and community safety. As such, gang murders continue *past* the homicide; they can propel and are propelled by social contagion, organizational memory, networks of competing groups jockeying for power, status, and resources, which shape future gang behaviours, including homicide (Papachristos 2009, p. 76). Future research should examine these collateral consequences in greater depth.

Third, how gang members made sense of, experienced, and responded to peer fatality was intimately shaped by the specific street, social, economic, and political contexts in which they were situated. Both of our studies involved marginalized and predominantly racialized men socially excluded and 'othered' in their respective societies (albeit to varying degrees), including in the education system and labor market, because of race and socioeconomic status. They were also—again, to varying degrees—harmed by and had to navigate state violence most notably in the form of criminalization, overpolicing, and police racism. For our participants, gang membership and its related activities (e.g., violence, drugs and weapons trafficking, other criminal endeavors) was a form of "resistant identity" (Castells 1997), a situated response and adaptation to their marginalization. Similar to other marginalized, gang-involved men, our participants reported that gang membership afforded them with opportunities that they felt were *less* or *un*available elsewhere, including economic benefits, independence, a sense of belonging, a (group) identity, and masculinity.

Fourth, in both studies, social media was central to how participants processed and responded to peer fatality. Though a thorough examination of how the "digital street" (Lane 2015, 2018) affects gang homicides is beyond the scope of this paper, our participants relied upon social media to learn about others' victimization, anticipate and hopefully evade future violence, collect information on potential motives/suspects, determine rivals' locations/movements, commemorate and grieve their murdered affiliates, try to save face when disrespected, and threaten to avenge their loved ones' homicide(s). Though much of their online presentations were performative and sometimes departed from real life (see Roks 2017b; Stuart 2020; Van Hellemont 2012), Urbanik's participants engaged in digital bravado, sometimes provoking suspected murderers and starting beefs with rivals and had to simultaneously navigate the risks and dangers of doing so (Urbanik and Haggerty 2018; Urbanik Forthcoming), which Roks's participants did not. Though social media can incite and propel gang violence in the real world, it is unclear which digital interactions can produce offline violence (Stuart 2020) and how the street and online milieus in which gangs' operate can affect this. Future research should examine the extent to which social media affects on-the-ground processes, including inter- and intra-gang dynamics.

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17 Whilst our participants spoke of how traumatic peer homicide is, they likely understated these effects given normative expectations about masculinity and gang narratives emphasizing toughness.

Despite these commonalities, the men in The Forgotten Village and in Regent Park had vastly different lived realities. While both our studies were based upon studying marginalized and street-involved men, the types and extent of our participants' marginalization differed, in part, due to their varying street contexts and positionality within their respective societies. We posit that these differences shaped how the men perceived, experienced, and responded to peer homicide. As our data reveal, Dutch Crips members *opted into* gang life because of glamorized ideals about what gang life entailed and *opted out* and pursued alternate avenues (e.g., collecting unemployment benefits, finding regular, low-paying jobs, or resorting back to street offending) when they became disillusioned ([Roks 2017b](#)). Notably, *feasible* alternatives *existed* and could be pursued. Gang joining and gang exit were distinct processes with few consequences, as violent victimization was rare even for the most senior members and whilst they claimed membership provided them protection, the broader social milieu rendered this alleged protection was largely unnecessary. By leaving the gang, they could essentially escape risk.

Conversely, gang life was not something the men in Regent Park *consciously* opted into or *could* essentially opt out of. Almost of all Urbanik's participants were born or fell into 'the life' because of their upbringing and neighbourhood context. The men reported Old Heads—often brothers, cousins, fathers, uncles, neighbours—grooming them into gang-related activities (e.g., drug running, stashing weapons, monitoring for police) during their pre-teen years, and merely "going along with it" as they aged. As poor and racialized men living in "the ghetto," they saw few if any opportunities to support themselves and their families outside of the informal economy, especially as they accrued lengthier criminal records. Since most were unable to relocate, gang exit seemed both implausible and futile as they could not easily sever their social ties and they considered violent victimization largely inescapable.[18]

Our findings also uncover that variances in our participants' respective positionalities and street cultures produced differences in how they experienced peer murder. In accordance with [Mares](#) ([2010](#), p. 41) observation that "the circumstances and settings of gang violence are highly variable", our findings indicate that the street milieus in which gang violence and homicide occur can have a notable influence on how gang member's experience and respond to peer fatality. In Roks's field site, gang violence and especially murder, was rare and momentous. One peer homicide prompted members' to contemplate the *realness* of Dutch gang life. Contrary to StudyA, the tragic frequency of peer fatalities in Regent Park diluted their impacts as murders did not have a "transformative magic" ([Katz 1988](#), p.129). Homicides did not signal the *realness* of gang life in Regent Park; the frequency of peer murder and the incessant risks posed by merely living in Regent Park meant these risks were largely imparted, inescapable, and had to be carefully mitigated. Though additional deaths were unquestionably tragic, their effects were relatively short-lived as the men recognized the need to "move on" quickly in preparation for the next loss.

While peer homicide disintegrated group trust and amplified conflict in both field sites, this occurred to varying degrees and in different contexts and therefore had different consequences for gang dynamics. In Roks's study, Sin's murder played a notable role in creating and exacerbating existing intra-gang disagreements and temporarily brewed distrust between group members. These mounting tensions pushed some members to leave the gang. Peer fatalities in Regent Park had similar effects, though they were amplified, particularly in terms of mounting distrust in and fear of trusted affiliates. Unlike in StudyA, this chronic wariness did not push the men to consider leaving gang life, as they were already navigating an environment where gang violence and broad distrust was the

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18   For many Black men/youth in Regent Park, "staying out of the life" does not necessarily protect them from violent victimization.

norm.[19] Whilst peer fatalities *amplified* distrust in the short-term, homicides did not notably change the gang's fabric, as they did in StudyA.

Like other social realities and motivations for action, gang violence is often influenced by an intersecting multiplicity of factors, and should be examined as a cultural, psycho-social, behavioural, and transactional manifestation occurring in a particular social setting (Brotherton 2015, p. 163) with locally-specific consequences. As our data show, while similarly disadvantaged gang-involved men in different gang, street, local, and national contexts make sense of, experience, and respond to peer fatality similarly, their experiences differ in notable ways due to their divergent social, economic, and political milieus. As such, examinations of how affiliate murders affect gang members and gang dynamics should be carefully situated within the broader milieus in which gang members operate. Going forward, gang scholars should remain cognizant of the complexity and messiness of gang violence and how its local context affects experiences of gang homicides.

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19 Their distrust must also be understood in relation to their broader distrust across their lives, and particularly, in broader social institutions which have often served as a source of institutional violence (see also Goffman 2015).

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Article

The Social Network Consequences of a Gang Murder Blowout

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Abstract: An unexpected crisis in a criminal organization offers a rare opportunity to analyze whether and how the configuration of business and trust relationships changes in response to external shocks. The current study recreates the social network of the Red Scorpion gang members involved in the Surrey Six Murder, one of the deadliest gang-related homicides to occur in Canada. The event, which involved two bystanders and six victims in total, was the result of a poorly executed retaliation. Our analyses focus on two phases of the network, the conspiracy phase and the post-murder phase. In each phase, we examine the balance of business, trust, and conflictual ties. Results show that the relative importance of key participants changed from the conspiracy to the post-murder phases, whereby strong, trusted ties gained prominence over the mostly business-oriented network of the conspiracy phase.

Keywords: gangs; social networks; crisis; organized crime; homicide; violence; retaliation

1. Introduction

Crime network scholars have sought to describe the inner workings of gangs and criminal organizations for long enough, now, that we have a general understanding of their structure, especially as it relates to specific activities such as drug trafficking (e.g., Bichler et al. 2017; Bright and Delaney 2013; Calderoni 2012; Malm et al. 2017; Malm and Bichler 2011; Morselli 2009; Natarajan 2006) and human smuggling (Bruinsma and Bernasco 2004; Campana 2020). More recently, an increasing number of scholars have turned to network data to study conflicts among gangs (Bichler et al. 2019; Descormiers and Morselli 2011; Lewis and Papachristos 2020; McCuish et al. 2015; Papachristos 2009; Papachristos et al. 2013). Rarely, however, can we dive inside a specific gang to examine how they manage relationships in trying times, such as when gang leaders are arrested, when a new gang challenges one's turf, or when the gang is under fire for having killed one or multiple bystanders.

The current study proposes to take an inside look into a specific murder conspiracy gone wrong. The conspiracy involves one of the most famous criminal organizations based in British Columbia (BC), Canada, the Red Scorpions. In summer 2007, two criminal groups merged forces under the label of the Red Scorpions (RS). The alliance expanded the organization, which now had two sides, the "Asian" and the "White" side, labeled as such by the members themselves. The so-called Asian side was led by Michael Le, the original founder of the Red Scorpions, while the White side was led by James Bacon, the leader of another criminal group involved in drug trafficking in the same area. The purpose of the merger was to improve the two groups' power within the drug trade via cooperation, including an improved ability to defend their turf against rivals when required.

With its loose hierarchy and emphasis on loyalty and symbolism, the Red Scorpions shared some organizational features with some of the mature, business-oriented gangs found in the American (e.g., Bichler et al. 2019; Papachristos 2009) or Canadian (e.g., Descormiers and Morselli 2011) literature.

Gang members could be identified by "RS" tattoos on their arms and necks, and the new members had to pass a sort of probatory period before being accepted as part of the Red Scorpion family. The main business of the Red Scorpions was running drug lines in the Lower Mainland, what locals labeled as "dial-a-dope" operations—a text messaging drug delivery service. At the time of the merger, approximately 30 to 40 members had the tattoos and were considered official members. Among them, approximately 20 to 30 individuals regularly attended the Red Scorpions meetings.

Court documents revealed that a few months after the merger, "bad blood" developed between James Bacon and a rival drug dealer, Corey Lal. Bacon threatened his rival's life and decided to tax him $100,000 as a way of resolving the dispute. But Lal never paid, so a conspiracy for his murder took shape. Otherwise, the RS group would look weak and powerless. Three members of the Asian Side, leader Michael Le, Matthew Johnston, and Cody Haevischer, along with four members of the White side, leader James Bacon, Person X, Person Y, and Kevin Leclair, participated in the conspiracy. The Surrey Six Murder took place on 19 October 2007, when Johnston, Haevischer, and a third unnamed accomplice ("Person X") broke into an apartment located in Surrey, BC, where Lal was used to carrying out his activities related to the drug business. That day, Lal was not alone; another four people were with him in the apartment, including one individual who was not involved in the drug trade. Another person, not involved in the drug trade, was dragged into the apartment from the hallway. All six people were shot to death in an attempt at eliminating any possible witnesses.

The Surrey Six Murder was the result of a series of unexpected external contingencies that thrust the organization into a crisis. The concept of crisis here refers to the chaotic group response that followed the gang homicide. The execution of six people was neither planned nor wanted by the group; the organization was not ready to deal with such a major event a few months after the merger and did not have a precise strategy to follow in case of unexpected contingencies. The aim of this study is to examine the social network consequences of this event on a major criminal organization like the Red Scorpions. Several studies have examined the effects of a crisis on legal organizations, but few studied crises in criminal organizations. Does the network become more cohesive—a sort of retrenchment phase—or does it instead break and fragment itself? We use social network analysis (SNA) as an integrative framework to describe both the network consequences for the organization, and the individuals within it.

2. Group Structure and Individual Centrality in Times of Crises

Organizational crises have been operationalized in different ways, including organizational death, decline, retrenchment, and failure (Mellahi and Wilkinson 2004). All definitions share a common feature: they underline that group crises have consequences on organizational structures and dynamics.

Sociologists have primarily focused on group dynamics and changes during crises in legitimate organizations (i.e., Hamblin 1958; Fink et al. 1971; Mulder et al. 1971; Tutzauer 1985; Uddin et al. 2010; Hossain et al. 2013). A number of studies have explored group dynamics during crises through the lens of SNA (e.g., Tutzauer 1985; Uddin et al. 2010; Hossain et al. 2013). These studies highlighted how a crisis within an organization impacts its internal structure or cohesion. Cohesion refers to the degree of connectedness of nodes within a network: The more people who are connected to each other, the more a network can be defined as cohesive. The inverse of cohesion is fragmentation, which refers to the proportion of nodes within a network that cannot reach each other by any path (Borgatti 2006).

Network scholars have discussed two effects of crises: (1) network fragmentation increases, creating multiple cliques (small, highly connected groups) (i.e., Uddin et al. 2010; Hossain et al. 2013); (2) homophily increases (i.e., see Lanzetta 1955). Homophily and network fragmentation are related concepts. The term "homophily" refers to the tendency of people to interact more with individuals they perceive as similar (McPherson et al. 2001). Fragmentation may increase homophilic individuals' tendencies to interact with similar others—and vice versa: a person's tendency toward homophily may itself lead to more fragmentation in times of crises, when the benefits of homophilous connections may also increase. For instance, Hossain et al. (2013) examined the crisis that afflicted the Enron Corporation

in 2001. Enron was one of the most important American energy, commodities, and services companies between 1985 and 2000. The authors analyzed Enron's e-mail networks, deriving from the large set of messages released by the US Federal Energy Regulatory Commission (FERC), to assess the changes that occurred in the communication network structures during the year of the crisis in 2001. The results showed a sharp increase in the number of cliques as the organization moved toward the peak of the crisis. Network members faced the crisis by increasing communication within small groups of people who felt closer to each other. Tutzauer (1985) claimed that, when two communication networks with the same number of ties and nodes are compared, the network characterized by the higher number of cliques is likely to be closer to dissolution. Yet, the presence of the cliques does not necessarily imply fragmentation of the whole organization. Stogdill (1959) suggested that group integration is higher when the subgroups are well coordinated and support the structure and the objectives of the larger group. In this context, subgroups or cliques can represent an escape from the organizational pressure and contribute to reinforcing the values and the identification of clique members with the larger group structure (Stogdill 1959). However, too much independence may hinder survival in the long run.

It is unclear whether illegal organizations behave similarly when crises occur. Some indirect results from studies examining the consequences of fragmentation have shown that an increase in fragmentation within illegal organizations has often led to increased competition and violence among newly born small groups (i.e., Massari and Martone 2019; Atuesta and Pérez-Dávila 2018; Falcone and Padovani 1991; Vargas 2014). Massari and Martone (2019) argued that the high level of fragmentation characterizing the Camorra is one of the explanatory factors used to understand the extremely violent nature of this criminal organization. Atuesta and Pérez-Dávila (2018) showed that the fragmentation within Mexican cartels led to a significant increase in intra-gang violence. Falcone and Padovani (1991) explained how inter-clan conflicts made the Italian organized groups more visible to the law enforcement, thus allowing the implementation of repressive actions that weakened the power of the Sicilian Mafia. The impact of crises may depend on the structure of the group. For example, Vargas (2014) showed that the arrest of two street gangs' leaders in Chicago led to increased inter-gang violence, but only within the group that lacked a solid organizational structure.

Few scholars have explored the effects of crises on criminal organizations from a network perspective. Some studies have examined the changes in criminal networks through different periods and have highlighted the flexibility that characterizes criminal networks when facing hard or unstable times (e.g., Bright and Delaney 2013; Ouellet et al. 2017; Ouellet and Bouchard 2018). Bright and Delaney (2013) examined the change and the evolution of a drug trafficking network across time and found that networks are flexible and adaptive structures following a process of adaptation similar to living organisms. Much on network adaptation can also be learned from crises occurring in terrorist groups. After all, these groups also manage their social networks, in part, to avoid law enforcement detection. Ouellet et al. (2017) studied the processes that drove collaboration between offenders in the Al-Qaeda (AQ) network before and after 9/11 (war on terror period). They found that although AQ leaders were still involved in planning activities after 9/11, they did so from an increased social distance, in sparser networks. Crises may also be driven by internal forces. Dissension between leader may, for instance, fragment the network, forcing the dissolution of many intragroup ties as leaders pull away from each other (Ouellet and Bouchard 2018).

A few organized crime scholars have described retrenchment processes that are helpful in framing our expectations toward the effects of crises on criminal organizations. Paoli (2007) described the reaction of Cosa Nostra to a massive law enforcement activity that threatened the organization. From a structural point of view, the solution of one of the most famous (and infamous) Italian Mafia bosses in modern history, Bernardo Provenzano, to ensure the cohesion and avoid potential defectors, was reducing the number of "men of honor" and creating a criminal elite to protect himself and the most important criminal members from police actions (Paoli 2007). The same strategy was adopted by Outlaw Motorcycle Clubs in the US in similar circumstances. According to Quinn (2001), during a

crisis, many of these clubs implemented a sort of "retrenchment" phase consisting of reducing the group size and creating an elite group based on core members.

From a network perspective, the "retrenchment strategy" suggests that, when facing crises, criminal organizations may adapt by decreasing the size of the organization, thus creating a smaller cohesive group of core members. The retrenchment strategy mentioned by Paoli (2007) and Quinn (2001) differs from the network fragmentation described by network communication scholars because of the way in which it impacts network structure and size. For example, the Enron group did not face the crisis by reducing network size, or by creating a single highly connected group of individuals (Hossain et al. 2013). The retrenchment strategy implies a significant decrease in network size, and the formation of one cohesive small group to protect the core members of the organization.

The effect of crises can also be analyzed from the point of view of individual group members. A few actors may benefit from the crises, improving their position in the network as a direct consequence of the events (Uddin et al. 2010). For instance, organizations may look to leaders for direction (Lanzetta 1955), which may increase their influence during periods of crises (Hamblin 1958), especially if they are counted on to control communications (Argote et al. 1989). The limited evidence for changes in criminal leaders' network positions is mixed (McCuish et al. 2015; Morselli and Petit 2007; Ouellet et al. 2017). Ultimately, whether leaders emerge as stronger or weaker from a crisis may well depend on the attribution of blame—was the crisis caused by the leaders in the first place? For instance, Morselli and Petit (2007) examined a criminal organization that faced a crisis of confidence as the police started seizing each of their drug shipments while refraining from arresting anyone over the course of the 18-month investigation. This allowed them to monitor how the network reacted and adapted to the crisis. Network members showed increased dissatisfaction and distrust with the initial leaders, who eventually lost their central role in the network after new leaders emerged.

3. Shared Goals, Trust, and Control as Elements of Cohesion and Individual Centrality

The quality of the ties connecting people, and the level of control exercised by some group members over others, may impact the way in which a criminal organization faces a crisis. In this study, we differentiated between three types of ties: trust ties (i.e., strong), business ties (i.e., weak), and conflict ties (negative). Different types of ties are linked to different kinds of social needs. Weak ties allow for efficient information flow (Granovetter 1973), but strong ties that provide social support may be most needed in times of uncertainty and crisis (Krackhardt 1992). We will examine this possibility directly by comparing the balance of strong, weak, and negative ties, and after the murder.

Relational aspects such as shared goals and trust among group members may play a key role in building strong group cohesion. Shared goals and trust are two key elements of criminal cooperation (Morselli 2009; von Lampe and Johansen 2004). Criminal relationships based merely on business interests, without the trust element, can be too weak to resist during times of crisis. According to Paoli (2008b), the weakening of solidarity and trust bonds in the Sicilian Mafia in the mid-2000s has caused a growth in the number of cooperating witnesses and a decrease in the criminal group's cohesion. Being surrounded by trustworthy offenders is even more important for those offenses that imply a higher degree of risk because they face the most serious consequences (Tremblay 1993; McCuish et al. 2015).

In this study, the level of control was articulated around (1) strategic network positioning of individuals; (2) the presence within the network of triadic groups based on strong ties. First, some individuals are more likely to exercise control over others by virtue of the strategic positions they occupy within their networks, a concept that can be measured via betweenness centrality (Morselli 2009). Betweenness centrality captures an individual's capacity to connect others who would not be connected otherwise. Higher betweenness values are associated with the ability to control the flow of information and resources in a network (Freeman 1977). Second, Simmel (1989) argued that triadic relationships based on strong ties have the power to reduce individualities, moderating conflicts and preserving group survival by imposing a certain level of control on individuals (Krackhardt 1999). In other words,

triads based on strong ties are a source of both control and social support for their members. In our study we identified as "strong ties" the relationships between individuals who share the same criminal goals but who also trust each other.

4. The Current Study

The Surrey Six Murder represents an ideal case study to observe the impact of a crisis on network structure. The available data allowed us to distinguish the conspiracy network connections that existed before the murder, from those that emerged after the event. Our study is articulated in different levels of analysis, focused on the effect of the crisis on individual centrality, but also on the network as a whole.

We focused on three main research objectives:

(1) To explore the impact of the crisis on network cohesion;
(2) To investigate the impact of the crisis on leaders' and other core members' centrality within the network;
(3) To understand the effects of the crisis on the quality of the ties and the level of control.

5. Materials and Methods

5.1. Data Source

The study data were extracted from court documents associated with the Surrey Six Murder Judgment. The transcript of the judgment was released in October 2014, and is available on the Supreme Court of British Columbia website at https://www.bccourts.ca/supreme_court/. The judgment referred to the trial of two members of the Red Scorpions group, two of the actual killers, Matthew Johnston and Cody Haevischer. The judgment described the reasons behind the court's decision to charge Matthew Johnston and Cody Haevischer with first-degree murder. The court documents provided us with detailed information about the relational connections between individuals involved in the case, the Red Scorpions group, its story and the status of its members, and particulars about the quality and the strength of the relationships connecting certain central members. The judgment also contained personal information about the individuals involved in the conspiracy and in the murder (e.g., name and surname, gender, nationality, and affiliation to a criminal organization). Only the first names and family names of people directly involved in the murder were mentioned in the judgment, while witnesses or individuals not directly involved in the trial were anonymized, as they are in our study. A total of 18 individuals were identified as part of the Surrey Six Murder case from the information presented in court documents.

The mixed-method approach that we applied included extracting cohesion measures and individual centrality indices from the Surrey Six network and doing a content analysis to define the quality of ties and the level of control within the network. The content analysis started with a read-through of the 175-page long Surrey Six Judgment and other Surrey Six materials, seeking to uncover the different types of relationships that connected the nodes, and situating the relationships as occurring before or after the murder. We identified three main categories of relationships: business ties, trust ties, and conflict ties. We then coded each social interaction as one of the three relationship types. When the information about the relationships among the individuals involved in the Surrey Six case was unclear, we searched for further details in the numerous newspaper articles related to the case. Searches were conducted using the names (or surnames) of the most important Red Scorpion affiliates involved in the murder (i.e., Michael Le, Matthew Johnston, Cody Haevischer, James Bacon). The names or surnames were followed by the keywords "Surrey Six" (i.e., Michael Le Surrey Six; James Bacon Surrey Six). We examined a body of 40 newspaper articles that provided us with further information on the relationships linking the individuals involved in the murder, as well as a book on the Bacon brothers written by an investigative journalist (Langton 2013).

5.2. Measures and Procedures

Our measures of the before and after Surrey Six network focused on six elements: group size, cohesion, fragmentation, individual centrality indices, tie quality, and control. Most will be used to describe the network and meso levels, while centrality indices will be used at the individual level.

5.2.1. Network and Meso-Level Measures

Group size: Group size refers to the number of nodes and the number of ties in the network.

Cohesion: At the network level, cohesion was measured employing three network metrics called "density," "average degree," and "degree centralization." Network density is the proportion of ties existing among nodes in relation to the maximum number of potential connections that can exist in the network if all nodes are reciprocally connected. Average degree refers to the average number of connections per node, which has the advantage of being less impacted by network size (a drawback of density). Finally, degree centralization assesses the extent to which the group's cohesion is organized around a particular node (Hanneman and Riddle 2005). Note that, because cohesion is normally associated with a set of positive relationships, we removed any negative ties before calculating the cohesion measures.

Level of fragmentation: Fragmentation was calculated through the total number of cliques, or the maximum number of actors who have all possible ties among themselves. If the number of cliques increases post-murder, it implies a higher level of fragmentation within the network.

Quality of ties: Tie quality has often been expressed by the concept "strength of ties" and has been measured in different ways in prior studies. Some studies have based it on the frequency of the interactions (Granovetter 1973), the recency of the contacts (Lin et al. 1978), the nature of the relationships (i.e., Ericksen and Yancey 1980), or the presence of at least one mutual friend (Shi et al. 2007). von Lampe and Johansen (2004) highlighted the importance of at least two relational elements, trust and shared criminal goals, to consider a criminal tie strong and exploitable. We classified the network ties in three categories: (1) trust ties, (2) business ties, and (3) conflict ties. The "trust ties" (friendships, positive family and romantic connections) were the strongest ties in the network. The term "business ties" refers to those relationships that were based only on shared business goals of an illegal nature. We classified the "business ties" as "weak connections" because of the absence of trust. Finally, the term "conflict ties" refers to the relationships that were based on shared business goals, but that also involved some level of conflict (e.g., Red Scorpion affiliates who clearly stated that they mistrusted other affiliates or had a conflictual relationship with them). The "conflict ties" captured the negative relationships in the network. At the network level, the overall percentage of trust, business, and conflict ties expressed the quality of the relationships the two networks were based on.

Level of control: At the meso-level, group control was calculated by integrating two theoretical approaches: the Simmelian theory of social control (Simmel 1989) and Heider (1946) theory of cognitive balance. Drawing from Simmel (1989) theory on triadic relationships, we identified positive triadic groups as cliques that provide both social support and social control. By "positive cliques," we referred to groups of three people connected through ties based on both shared business goals and trust.

However, triadic relationships can be composed of different types of ties, such as trust, business, and conflict ties. To establish the extent to which "mixed triads" could potentially become positive triads, we used Heider (1946) theory of cognitive balance. Cognitive balance theory proposes that when strong ties between A and B, and A and C exist, B and C are very likely develop a positive tie as well. The search for cognitive balance would encourage B and C to align their feelings with those of their common strong tie A.

Heider's theory was subsequently translated into graphic–theoretic language by Cartwright and Harary (1956). Signed graphs assigned positive or negative values to each tie composing the triad: an odd number of negative signs made the graph unbalanced. We translated trust, shared business goals, and conflict ties into signs: trust ties were positive (+), business ties were neutral, and conflict ties were negative (−). Only those cliques composed of at least two signed ties (+ and −) were taken into account.

If the multiplication of the signed ties gave a positive result (i.e., +*+ = +; − * − = +), it meant that the clique was balanced; thus, the group could potentially be, or become, a strong positive clique that provided support and control. On the other hand, if the multiplication of signed ties gave a negative result (i.e., +*− = −), the clique was unbalanced; thus, the triadic group was not likely to become a strong positive clique. The unbalanced clique could be considered as a potential source of conflict.

5.2.2. Individual Level of Analysis

Betweeness centrality: We measured the extent to which a node occupied a strategic position in the network using betweenness centrality = the extent to which a node connect nodes that would not be connected otherwise. Occupying a strategic position within the network also means being able to control the flow of information and resources within it (Freeman 1977).

Quality of ties: At the individual level, tie quality can influence the impact of individual positions within the network. The quality of node relationships was examined descriptively by counting the number of trust ties and conflict ties surrounding each node.

6. Results

Figure 1 represents the Surrey Six Murder network before and after the murder, respectively. The squared nodes represent the individuals who took part in the conspiracy; in brown are the Asian side's members, while in orange, the White side's members. The blue square in Figure 1a indicates that Sophon Sek was present during the conspiracy but was not part of the Red Scorpions group. The round nodes represent the individuals who were not directly involved in the conspiracy but who, for some reason, played a role in the Surrey Six Murder story. The red round nodes and the gray nodes in Figure 1b represent, respectively, the newcomers (nodes who were not present in the pre-murder network) and the nodes who disappeared after the murder.
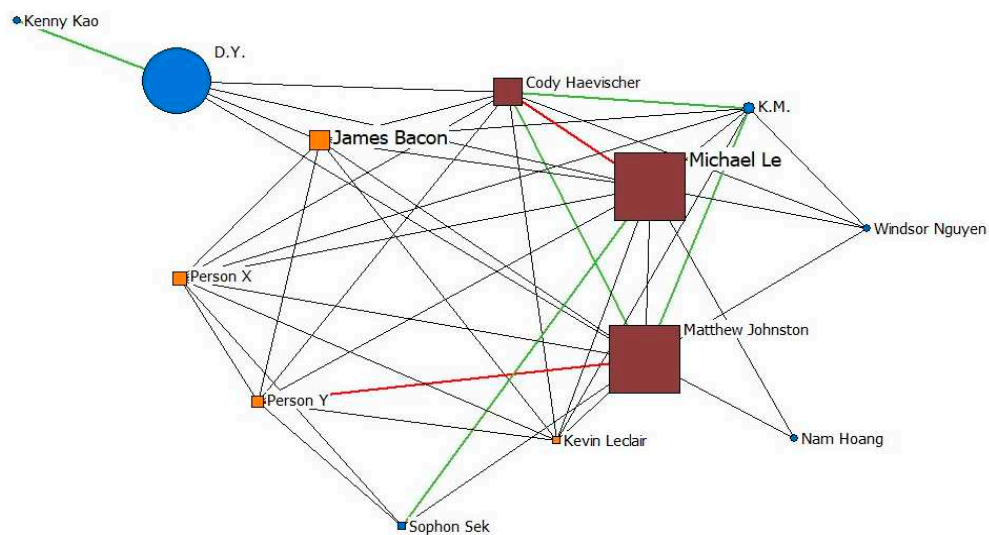
(**a**) Conspiracy network before the murder

Figure 1. *Cont.*
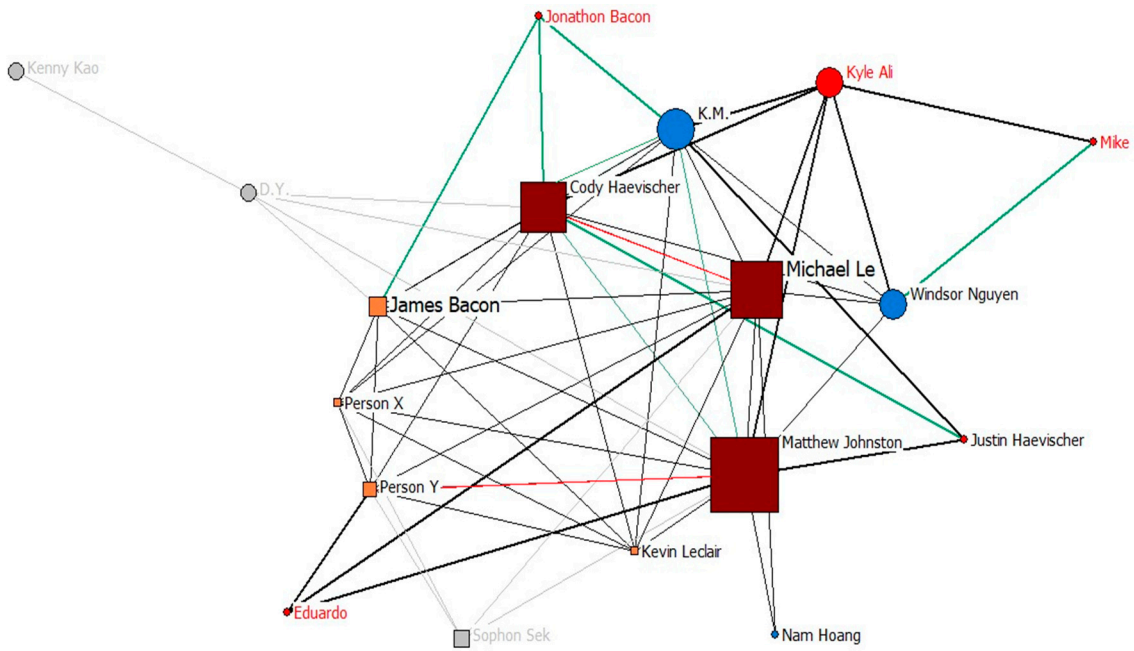
(**b**) Conspiracy network after the murder

Figure 1. The Surrey Six Murder network before (**a**) and after (**b**) the murder. Notes. The squared nodes took part in the conspiracy, rounded nodes did not. The brown nodes represent the Asian side, while the orange nodes represent the White side. The black lines represent business ties, the green lines trust ties, and the red lines conflict ties. Leader names in bold. Node size by betweenness centrality. (**a**) The blue squared node was involved in the conspiracy but was not part of the Red Scorpions. (**b**) The gray nodes and lines stand for the nodes and ties that disappeared after the murder. The lines in bold and the red rounded nodes represent the ties and the nodes that appeared after the murder.

Node size was determined by betweenness centrality values; the larger the node, the higher its betweenness centrality score within the network. At first glance, we notice that the leader Michael Le and the other members of the Asian side occupied a central position in both the pre- and the post-murder network, while the members of the White side, led by James Bacon (in bold), seemed to play a more marginal role, especially after the murder. The colors of the ties stand for the quality of the relationships that bonded the nodes together. The black lines indicate that nodes were connected through a business relationship, the green lines represent relationships based on both trust and shared business goals, while the red lines represent the relationships characterized by shared business goals and some level of conflict. In Figure 1b the gray lines represent the relationships that disappeared after the murder, while the bold lines represent the new relationships that were not present before the murder.

Looking at the green ties, it is possible to identify the strong positive cliques composed of three trust ties. The clique that included Cody Haevischer, K.M., and Matthew Johnston, present in both the pre- and post-murder networks, is an example of a strong positive triad. On the other hand, the cliques with red, green, and black lines, such as the clique comprising Le, Haevischer, and Johnston in both networks, represent an unbalanced triad. Finally, the balanced triads are characterized by two green lines and one black line, such as the one including Jonathon Bacon, James Bacon and Haevischer in the post-murder network.

6.1. Network Structures before and afetr the Murder

To start, we examine the structures, the quality of ties, and the level of control in the network before and after the murder. The post-murder network represented the group during a period of crisis. The study focused on a period of about one year. The pre-murder phase referred to the period

from the merger, which occurred in summer 2007, to the murder in October 2007. The post-murder phase referred to the events that followed the murder until Spring 2008. Given that we were analyzing the same group under a short time frame, we did not expect the network to show dramatic changes. Yet we did expect the group to have made adjustments as they managed the aftermath of the event.

Table 1 presents a number of characteristics of the network before and after the murder. Overall, the results show that the network evolved toward increased fragmentation, as would be predicted by the literature on the impact of crises on social networks.

Table 1. Comparison of network structures before and after the Surrey Six Murder.

	Before the Murder		After the Murder
Number of nodes	13	⬆	15
Number of ties	42	⬆	49
Density	0.269	⬇	0.233
Average degree	3.231	=	3.267
Degree centralization	0.765	⬇	0.637
Number of cliques	6	⬆	8
Percentage of business ties	100%	=	100%
Percentage of trust ties	11.8%	⬆	16.3%
Percentage of conflict ties	4.8%	=	4.1%

Note. Arrow up and down indicates increase/decrease after the murder, respectively; equal sign means no change.

First, the network changed only slightly in size, with two more individuals and seven additional ties after the murder. Second, cohesion, which included both the density and the degree of centralization of the network, declined after the murder, with the former decreasing from 0.269 to 0.233 and the latter decreasing from 0.765 to 0.637. The decrease in centralization indicated that ties were spreading out across the network, potentially making pre-murder hubs less central than before. This was also consistent with the increased number of cliques (from six to eight) that we noticed post-murder. Average degree remained stable, showing that people did not change the number of connections they had; it was how these connections were spread out that differed.

Some changes to the post-murder network involved the quality of the ties. We observed that the proportion of trust ties increased post-murder, from 11.8% to 16.3%. The proportion of business and conflict ties remained similar.

The quantity of unbalanced triads did not vary after the murder. Both the pre- and post-murder networks were characterized by three unbalanced triads. The unbalanced cliques mostly involved core conspiracy members, such as Michael Le, Matthew Johnston, Cody Haevischer, and Person Y. The only individual involved in the unbalanced cliques who was not directly involved in the murder and who was not officially part of the Red Scorpions group was K.M—Haevischer's girlfriend and the only woman in the network.

Where things changed, post-murder, was with the balanced triads. Indeed, no balanced triad was identifiable in the pre-murder network. Yet, three balanced triads formed after the murder. The post-murder balanced cliques included two core conspiracy members, James Bacon and Cody Haevischer, as well as three non-conspiracy members: K.M, Jonathon Bacon, and Justin Haevischer. The addition of three family/romantic ties (two brothers and a girlfriend) increased balance in the network.

The analysis of the dyadic connections characterizing the pre- and the post-murder networks further clarified what is stated above. On the one hand, the individuals who were part of the RS group and took part in the conspiracy were mostly linked to each other through business or conflict ties.

On the other hand, all the trust connections in the network linked core conspiracy members to nodes who were external to the group.

6.2. Individual Level of Analysis

Table 2 shows the individual centrality measures and the individual tie quality both before and after the murder. We assessed the nodes' betweenness centrality by comparing the values related to the pre- and post-murder networks; thus, only those individuals who were present both before and after the murder are included in the table.

Table 2. Individual centrality measures and individual quality of ties before and after the murder.

	Before Betweenness		After Betweenness	Before Trust and Distrust		After Trust and Distrust
"Asian Side"						
Matthew Johnston	0.174	⬆	0.192	2 T + 1 D	= T = D	2 T + 1 D
Michael Le	0.174	⬇	0.139	1 T + 1 D	⬇ T = D	0 T + 1 D
Cody Haevischer	0.059	⬆	0.119	2 T + 1 D	⬆ T = D	4 T + 1 D
"White Side"						
James Bacon	0.033	=	0.030	0 T + 0 D	⬆ T = D	1 T + 0 D
Person X	0.019	⬇	0.002	00	= T = D	00
Person Y	0.011	⬆	0.017	0 T + 1 D	= T = D	0 T + 1 D
Kevin Leclair	0.003	=	0.002	00	= T = D	00
Others						
K.M.	0.011	⬆	0.093	2 T + 0 D	⬆ T = D	3 T + 0 D
Windsor Nguyen	0.000	⬆	0.066	00	⬆ T = D	1 T + 0 D
Nam Hoang	0.000	=	0.000	00	= T = D	00

In green: the nodes who experienced a significant decrease in betweenness centrality and who decreased the number of trust connections, as well. In red: the nodes who represented a significant increase in betweenness centrality and who increased the number of trust connections, as well. **In bold**: the leaders. Arrow up and down indicates increase/decrease after the murder, respectively; equal sign means no change.

Before the murder, individuals from the so-called Asian side of the Red Scorpions were the most prominent in terms of brokerage. All three of Johnston, Le, and Haevischer had the highest betweenness centrality scores—both before and after the murder. We could have expected James Bacon, the leader who gave rise to the dispute, to play a more important role in the Surrey Six Murder. Johnston, Le, and Haevischer were also central in terms of trust relationships. Each of them had at least one trust connection in the network. However, all three were also surrounded by a conflict tie that weakened the overall quality of their relationships. As for the outsiders to the RS or to the conspiracy, its worth noting that K.M occupied a unique position in the pre-murder network in terms of tie quality (two trust ties), a position that she consolidated after the murder when she added a third trusted tie.

After the murder, some changes occurred. First, only some of the leaders improved their network position. While Le experienced a slight decrease in betweenness, Johnston and Haevisher both improved their pre-murder positions. None of the RS from the White side noticeably improved their positions. Second, when focusing on tie quality, the node who experienced the greatest increase in betweenness, Haevischer, was also the one who had the largest increase in trust connections, from two to four. Leader Michael Le lost his sole trust tie post-murder—the only individual to lose a trust connection. Third, two nodes who substantially increased their betweenness centrality after the murder, K.M. and Windsor Nguyen, were not core conspiracy members. The increase in betweenness centrality was particularly evident in the case of K.M., who became one of the most central individuals in the network after the murder.

Finally, five new individuals appeared after the murder, three of whom were Red Scorpion members' relatives: Jonathon Bacon (James' brother); Justin Haevischer (Cody's brother); Mike Nguyen (Windsor's brother). The newcomers were not involved in the conspiracy and played marginal roles in the network. However, they were rather central in terms of trust connections. Justin Haevischer, for instance, was surrounded by three trust connections, two of which linked him to core conspiracy members.

7. Discussion

The Surrey Six gang murder blowout case gave us a unique opportunity to explore the effects of a period of crisis on a criminal organization. The comparison between the pre-murder and the post-murder network helped us assess different hypotheses testing the cohesion of organizations and the centrality of individuals during crises.

Our study results showed that the Surrey Six Murder network followed many of the patterns found in legal organizations (see Tutzauer 1985; Uddin et al. 2010; Hossain et al. 2013). The level of fragmentation and network size increased post-murder, while the network's density and centralization decreased. These results suggested that individuals sought to increase their connections, but these new connections were not to the core conspiracy members.

We did observe network changes after the Surrey Six Murder, but the adjustments were different from the retrenchment phases that occurred in major organizations like the Italian Mafia (Paoli 2007), American biker gangs (Quinn 2001), or Al-Qaeda (Ouellet et al. 2017). Similar to what Ouellet and colleagues observed for terrorist groups like the Toronto 18 (Ouellet and Bouchard 2018), the network showed signs of fragmentation after the crisis. In addition, the role of the leaders (Le and Bacon) was diminished after the murder, something that was also observed in prior studies (Morselli and Petit 2007). This was also true of most other core conspiracy members who experienced slight decreases in betweenness centrality. Cody Haevischer was the only core conspiracy member whose centrality increased after the murder.

Analyses of tie quality and control provided insights on potential reasons for why the Surrey Six Murder network did not experience a sort of retrenchment phase around core members. The pre-murder network comprised a high percentage of business ties, but a low level of trust and control, especially within the core conspiracy members group. After the murder, the proportion of trust ties increased along with the number of positive and balanced cliques. These results supported prior research that suggested that strong ties are particularly effective when a group faces uncertainty and crisis (Krackhardt 1992), thus needing to reinforce obligations and social norms (Coleman 1988). In the same way, intensifying the level of control over individuals and information flow is essential when the group is threatened (Argote et al. 1989; Hossain et al. 2013), which is especially relevant in the case of organized crime (Paoli 2002).

The increase in trust and control that characterized the post-murder network could be linked to the increase in the network's fragmentation and size. Paoli (2008a, 2008b) argued that criminal organizations that implemented the retrenchment strategy were built on a high level of trust and solidarity shared by all members. The meso-level analysis of dyadic relationships showed that the

Red Scorpion core conspiracy group was built mainly on business and conflict ties, while the trust relationships in the pre-murder network linked mostly core members to nodes who were external to the group. The positive cliques that did exist involved mostly nodes who were external to the conspiracy. This network configuration was even clearer in the post-murder network, where we observed the addition of new trust relationships that connected the core members to nodes who were not present before the murder.

The most lasting and stable organized crime groups are typically founded on pre-existing trust ties and collective shared identity (Paoli 2002, 2007). It could be that the low levels of trust found in the Red Scorpions made room for family members and other trusted ties to join in, post-murder, as a currency that was scarce yet needed in times of crisis. Criminal organizations need to balance efficiency and security (Calderoni 2012; Morselli 2009), but they may not always search for that balance unless circumstances force them to.

The study has some limitations that are necessary to discuss. One of the main problems is missing data, as the study only includes those who were mentioned in the Surrey Six Judgment. Some individuals who were either not involved in the law enforcement investigation or included in the judicial decision may be missing. The missing data can impact all the network indices. For instance, trust ties may be more present than the court documents show. A concern related to node centrality is that the judgment is centered on the trial of two individuals, Cody Haevischer and Matthew Johnston. Thus, Haevischer and Johnston's high centrality scores may be due to the fact that they were central in the judgment. Indeed, we examined the Surrey Six conspiracy network from the point of view of two of its most central players, not the Red Scorpion network as a whole. The scientific literature on crises within criminal organizations has often analyzed changes that occurred within the organization at large, which could explain why our results sometimes diverged. As with all court data, the information included in the judgment could lack objectivity because it was mostly based on witnesses' declarations and law enforcement's recollection of the events. Thus, only the declarations that have been considered reliable by the court were included in the analysis. A further factor that might have influenced the RS network changes is the non-typical merger between the two gangs that occurred a few months before the murder. Because of the merger, the organization was potentially more exposed to fragmentation than longstanding, ethnically homogenous, and well-structured criminal organizations.

When dealing with court records and police investigations, Campana and Varese (2012) suggested performing external validity checks by means, for instance, of interviews with key informants and other open source records. Rostami and Mondani (2015) study showed that different data sources related to the same study object have a fundamental impact on the network results. Although we were able to find numerous written materials on the case, interviews with key participants would have helped provide further context on specific relationships included in the network, including potentially missing ones. Finally, the study of the Red Scorpions, as an organization, was limited to a very specific time frame. We did not have access to specific data on the evolution of the group post-crisis, nor was it the aim of the study. That said, there is some evidence to suggest that the organization suffered after many of their leaders were arrested and charged in major police operations in the years following the Surrey Six Murder. Yet more than 10 years after the post-murder phase we analyzed in this study, the Red Scorpions was still an active gang in BC (e.g., Bolan 2019).

Despite these limitations, the Surrey Six Murder represented a unique opportunity to study organized crime groups during crises from a network perspective. Rather than a retrenchment phase taking place after the murder, the network expanded in size, leading to decreased cohesion. Leaders became less central as trusted connections integrated the network. This sort of adjustment—reduced importance of leaders—is not in and of itself a negative outcome for the group. When trust is not in short supply, criminal leaders can afford to position themselves on the periphery of conspiracy networks, as heavy involvement is simply not required –trust among participants removes much of the need for control (Calderoni 2012). Trust was lacking prior to the Surrey Six murder, making it the most pressing need to address post-crisis. To our knowledge, no studies have measured the impact

that a lack of trust and control can have on a criminal organization and its survival. The survival of criminal organizations depends on a variety of factors that are not necessarily linear; small groups survive longer when they forge alliances with outsiders, but larger groups benefit more when they strive to keep alliances within (Ouellet et al. 2019). Achieving proper balance between efficiency (and profit-making) and security, between waging wars over turf or sharing turf, are some of the most consequential—yet understudied—decisions made by gang leaders.

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Article

Changes in Personal Social Networks across Individuals Leaving Their Street Gang: Just What Are Youth Leaving Behind?

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Abstract: Despite a small but growing literature on gang disengagement and desistance, little is known about how social networks and changes in networks correspond to self-reported changes in street gang membership over time. The current study describes the personal or "ego" network composition of 228 street gang members in two east coast cities in the United States. The study highlights changes in personal network composition associated with changes in gang membership over two waves of survey data, describing notable differences between those who reported leaving their gang and fully disengaging from their gang associates, and those who reported leaving but still participate and hang out with their gang friends. Results show some positive changes (i.e., reductions) in criminal behavior and many changes toward an increase in prosocial relationships for those who fully disengaged from their street gang, versus limited changes in both criminal behavior and network composition over time for those who reported leaving but remained engaged with their gang. The findings suggest that gang intervention programs that increase access to or support building prosocial relationships may assist the gang disengagement process and ultimately buoy desistance from crime. The study also has implications for theorizing about gang and crime desistance, in that the role of social ties should take a more central role.

Keywords: desistance; social networks; street gangs; network composition; criminal behavior

1. Introduction

Mounting evaluation research has shown few successes across the gang intervention landscape. As scholars have grappled with this realization, they have begun to more closely examine the characteristics and motivations related to individuals leaving a gang, and thus attempted to be more precise in defining gang leaving. The term "disengagement" was borrowed from (Bjorgo 2002; Bjorgo and Horgan 2009) on extremist groups to distinguish the process of leaving a gang from that of desisting from crime after de-identifying as a gang member. A former gang member might indicate that they have left the gang, but continue to hang out with members of the group, or participate in some gang activities (and hence, is not fully disengaged). This distinction has been deemed important because research has shown that leaving a gang does not necessarily equate to leaving a life of crime (Melde and Esbensen 2014; Sweeten et al. 2013). Additionally, studies indicate that periods of active gang membership are relatively short, often under one year (Esbensen and David 1993; Krohn and Thornberry 2008). Researchers stress that leaving the gang is a process (i.e., a continually changing social activity, as opposed to a static activity or event), that should be carefully studied, and in conjunction with crime desistance. Fortunately, the literature examining these concomitant issues has grown in the last five years. However, the research is still in its infancy.

The few studies that take a deeper dive to examine the process of leaving a gang generally focus on the relationship between levels of disengagement and involvement in and desistance from crime over time, with little description of the contextual, social and interpersonal changes that may have accompanied changes in gang membership. Scant research examines the nature of the social context of peer groups and other relations that potentially provide support and both deviant and prosocial learning opportunities across the life course, and how changes in relationships may support gang leaving. In this paper, we provide a descriptive picture of gang disengagement across youth living in two mid-eastern cities in the United States, with a specific focus on the social network characteristics of youth while they are in gangs and during the process of leaving and disengaging from the gang. We use a social network analysis framework, and specifically, a personal network research design (PNRD) to study the composition of gang members' extended personal networks as well as changes in those networks. Personal networks are known as "ego networks" or "ego-centric networks" and are not whole networks in the sense that they are not bounded by a group characteristic—such as a gang or organization[1].

Social network analysis refers to both a perspective for examining social relations and a methodological technique for analyzing those relations. The technique has been used in a wide range of academic disciplines dating back to the 1930s but is considered relatively new within the study of criminal behavior (Bouchard and Malm 2016). Relations between actors create patterns and, eventually, structures that in turn shape the behavior of individuals (Marsden 1990; Wasserman and Faust 1994). Social network data describe the contacts, ties, and attachments that one individual has to another. By examining these data, and recreating the social networks of each individual, researchers can reconstruct the patterns of interaction and social structures that influence individual behavior. Within criminology, Krohn (1986) was among the first to suggest that a social network approach was important for understanding delinquent and criminal behavior.

Although using a network analytical framework is relatively new to criminology, relationships and the nature of those bonds at least played some role in theorizing about crime and desistance, particularly with regard to youth delinquency. Social bonding theory and social learning theory have a clear emphasis on relationships, but it was not until the work of Warr (1996) and Sarnecki (2001) that scholars began to more clearly emphasize the importance of bidirectional relations and the resultant interactions and formative dimensions in creating and maintaining delinquent and criminal behavior. Furthermore, understanding the attachments youth and young adults have to other relations outside of peers began to capture more attention as life course and developmental theories emerged (Roman et al. 2017). A PNRD allows a researcher to elucidate a wide array of social ties for the sample's respondents, potentially providing powerful measures of interpersonal influence that may be strongly predictive of behavior (Valente 2010). The decision to study ego networks, versus a whole network such as a specific gang, is a purposeful, theoretical choice to focus on the local, or individual, rather than the global. A nuanced understanding of the range and extent of social attachments of gang members is also important for policy and practice; particular relationships or types of social ties may be possible leverage points for both gang prevention and gang intervention. Furthermore, we know from extant research that keeping youth from gangs and getting youth to leave gangs after they join are worthwhile endeavors that can keep youth from increasing their level of involvement in violence and can lower overall engagement in delinquent behavior (Melde and Esbensen 2014; Sweeten et al. 2013; Valasik et al. 2018; Weerman 2011).

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[1]   In most cases with PNRD, only the ego is the respondent, and all of the information about the alters and their ties to other alters is obtained from the ego. In contrast, in a survey-based whole network or sociocentric design, every node or actor in the network is a respondent, and information about the ties between nodes (i.e., alters) is obtained from the alters themselves (although sociometric data can be analyzed with an ego-centric focus).

2. Background

2.1. Desistance

Researchers have spent more time theorizing about desistance from crime more generally than about leaving a gang, specifically. Theoretical perspectives on desistance from crime are relevant to leaving a gang, as work examining desistance from a number of negative behaviors (e.g., crime, alcohol, drug use, and gangs) suggests that desistance processes and the causal mechanisms associated with them are similar across different behaviors. In the following paragraphs, we provide a short overview of the crime desistance literature to set the stage for a discussion of gang desistance as it relates to the process of leaving a gang.

In recent years, the application of developmental and life course frameworks has facilitated an understanding of the dynamic processes related to crime desistance. Such frameworks provide a context for situating individuals along dimensions of continuity and change as they age and experience potential turning points. Within these frameworks, life events are unpredictable, yet salient, features that modify or influence criminal careers. The timing of these events in the life course and their relationship to other events or contexts also play a crucial role in behavior. Essentially, a developmental framework emphasizes non-random change in individuals' offending behavior across various stages of development (Loeber and Blanc 1990). The overarching reasons for crime desistance can be internal (i.e., consistent with human agency) or external (i.e., consistent with structures or events) to the individual, or provide influence through a complex interplay.

Depending on one's specific theoretical lens regarding crime desistance, agency and structure can take on more or less dominant roles. In the early years of theorizing about desistance, theorists tended to fall on the extremes of the internal versus external forces spectrum; today there is much less focus on the internal-external debate and more attention paid to the timing of events and processes across the life course, though some theorists may still emphasize the sides of the spectrum. Sampson and Laub's (1990, 1993, 2003) age-graded theory of crime takes the position that structure—external forces—are most salient and asserts that crime occurs when bonds to society are weakened or broken. Social ties are aspects of structural forces generally captured in aggregate form through bonds to or interaction with age-graded institutions such as marriage. Significant life events or socialization experiences in adulthood—called turning points—can modify trajectories of crime in significant ways. These turning points are external—the result of macro-level institutional processes and the resultant roles (Laub and Sampson 2001, 2003; Teruya and Hser 2010)—and hence are largely contextual or situation based. Laub and Sampson view desistance as a process where reductions in offending take place over time and usually occur much earlier than one's last criminal offense in one's criminal career. Hence, desistance is not simply the termination of one's criminal career.

Theorists that focus less on structure and more on human agency and identity include Bushway and Ray (2013), Maruna (2001, 2016), and Giordano et al. (2002, 2007, 2015). Their perspectives give a more central role to cognitive shifts as internal reevaluations that give voice to dissatisfaction with some aspects of a current lifestyle or can envision prospects for an improved life. These reevaluations induce motivation to change. Such cognitive shifts can be related to maturational processes and/or conscious decisions based on a reappraisal of the costs and benefits of crime (see Ronald and Cornish 1985). Cognitive shifts can lead to changes in the external environment or contexts that support or weaken bonds. Individuals may take on more prosocial roles and relationships or be open to participation in conventional institutions after initial cognitive shifts. Early work by Giordano et al. (2002, 2007) gives particular voice to an individual's own role in selectively appropriating elements in the environment that act as "hooks for change". Strengthened or newly founded relationships can be hooks for change. However, the focus is first on agentic moves because the emphasis is on how individuals respond to the structural obstacles they encounter, not the objective social circumstances. Maruna's (2001, 2004) work focuses on the psychosocial factors that sustain abstinence from offending, and in particular, the

cognitive processes that support the identity of a pro-social self. For both Maruna and Giordano, structural influences are very close behind and sometimes intertwined with the shift in identity, but Bushway and Paternoster, in contrast, postulate that offenders first desire to change and that desire to change is accompanied by a shift in identity that precedes any shift to prosocial networks or prosocial behavior.

Some desistance theorists view changes in offending as more of a balanced interaction between structural forces and human agency and do not necessarily impose a causal ordering on the factors that create change (see, for instance, Bottoms et al. 2004; Farrall 2002; McNeill 2006, 2016; McNeill and Weaver 2010; Weaver 2012, 2016). Weaver (2012, 2016; Weaver and McNeill 2015), drawing on relational sociology, suggests that individuals seek meaningful and consistent ways to refer to themselves (the creation of an identity) and that this reflexive nature cannot be disentangled from the social context, where social ties can take center stage. Weaver argues that past theories are restricted in their capacity to reveal how agentic moves are variously enabled or constrained by the relational contexts and that more focus should be put on the dynamics and properties of social relations.

2.2. Desistance in the Context of Gang Members

Interestingly, much of the scholarship on desistance does not include direct reference to populations who are gang members—when it is gang members who, while in a gang, often exhibit active violent offender careers throughout youth and young adulthood. Furthermore, some of the extant theories do not easily apply to the lives of gang members. For instance, some of the key turning points that have been described in the life course literature are not readily generalizable to gangs because gang youth are younger than marital age, tend not to marry, and do not secure the same prosocial opportunities (e.g., post-secondary education, jobs, military service, etc.) as the average young person (Carson and Vecchio 2015). Although some of these turning points may be relevant to desistance from crime for gang members, there is likely even more complexity involved in understanding crime desistance when one has a peer group or related social networks that support and reinforce delinquent and criminal behavior. A few recent studies have broadened the types of turning points to include adverse life events and experiences, such as incarceration and violent victimization (Sampson and Laub 2016; Soyer 2014; Teruya and Hser 2010).

It may be that the desistance literature does not have a related body of studies that include direct reference to gang members because gang desistance has generally been operationalized as leaving a gang and not necessarily associated with the termination of a criminal career. As such, gang desistance historically has been viewed as a separate topic in criminology but intersecting with crime desistance. Scholars began to delve deeper into the meanings and measures around gang desistance in the early 2000s. Pyrooz and colleagues suggested that gang de-identification—when an individual declares (or responds on a survey) that they no longer belong to a gang—is an event to be distinguished from gang desistance. As described in the introduction, gang desistance falls into the category of being a process, and should be designated as "disengagement" in that disengagement is a process that unfolds over time (Pyrooz et al. 2014; Pyrooz and Decker 2011; Sweeten et al. 2013). For some gang members, disengagement may equate to steep reductions in levels of involvement with the group, but for others, it does not (Decker and Lauritsen 2002; Pyrooz et al. 2014).

With regard to the gang disengagement process, Decker et al. (2014), in a mixed-method study of 260 former gang members, drew on the four stages in Ebaugh's (1988) role exit theory and applied it to the process of gang disengagement. They described the gang "exit" process as moving through stages: (1) first doubts, where gang members contemplate the symbolic and instrumental value of their current role; (2) weighing alternative roles, where gang members engage in anticipatory socialization of new or different roles; (3) turning points, which function as the crystallization of discontent to act on the aforementioned considerations; and (4) post-exit certification, which works to validate new

roles while inoculating gang members from old ones. They indicated the process was not linear for the gang members in their sample, and that gang members often relapsed to old expectations and roles. Essentially, they stressed that gang members may see themselves with many different identities and roles, both conventional and criminal. Gang members may also vacillate between times of active participation in gang activity and more complete withdrawal from gang ties even after reporting leaving the gang.

Studies conducted before Decker and colleagues' study suggest that when perceptions and objectives of a gang member begin to run opposite to his/her beliefs or priorities, he/she will leave the gang (Spergel 1995; Vigil 1988). Events such as the victimization of friends or an increasing commitment to family can lead a gang member to gradually reduce time spent with other gang members. These earlier studies of the reasons or motivations for leaving a gang led to the development of a framework to organize the different reasons youth and adults may leave a gang. The push-pull categorization, originally conceptualized by Decker and Winkle (1996) with regard to gang entry, divides the reasons for leaving into those that relate to aspects of gang membership that are internal to the gang (pushes) and those that are external to the gang (pulls). Negative occurrences related to the gang are pushes—aspects of life or events that push the individual to begin to desire a more prosocial life. Pushes can be internal aspects such as disillusionment or maturation. These individuals reach a point when the costs of engaging in violence outweigh the benefits (Decker and Lauritsen 2002; Decker and Winkle 1996).

Pull factors are factors that are external to the gang, serving to attract gang members to prosocial others and institutions. These factors can include having a child, getting a job, or other turning-point-like factors that help develop or strengthen bonds to conventional society. Research has shown that push and pull factors often operate in concert (Decker et al. 2014), and one factor may not be sufficient for gang de-identification and/or disengagement. Consistent with Decker and colleagues' research mentioned above, recent research by Roman et al. (2017) that examined reasons for leaving a gang across three large multi-site datasets found that few respondents reported only push or pull factors, but as the average age of the sample decreased, so did the number of reasons provided.

Although the push-pull categorization is not grounded in a particular theory or set of theories, it is apparent that the pull factors closely align with prosocial opportunities and experiences with new or strengthened social relations that offer opportunities and provide support for or reinforcement of a new non-gang or non-offender identity. Similarly, social relations play a salient role in at least two stages of Decker et al.' (2014) disengagement framework that utilizes role exit theory. At stage 2, where gang members are engaging in anticipatory socialization of new or different roles—this "socialization" often involves assessing and re-assessing their involvement with and attachment to other relations. Stage 4—post-exit validation—involves external reference groups, such as family or new friends (p. 276). Indeed, it is possible that relations play a significant role across all gang exit stages and is a key factor in long-term desistance from offending. This aligns with Bersani and Doherty's (2018) recent review of the crime desistance literature. When discussing identity construction, they state: "whereas this divergence between external pressures and internal progress may emerge from individual narratives, successful desistance may hinge on external social networks" (2018, p. 321). Their conclusion includes a mention of research by Giordano et al. (2007) which articulates that emotional maturation is related to the expansion of social interactions during the developmental period of young adulthood and particularly where criminal behavior no longer brings positive reinforcement. Similarly, newer theorizing about crime desistance includes the work of Beth Weaver (2012, 2016), as mentioned earlier, who draws on relational sociology to posit that individuals seek meaningful and consistent ways to refer to themselves (the creation of an identity) and that this reflexive nature cannot be disentangled from the social context. Weaver emphasizes social roles and discusses gang members in that social roles and relationships are particularly relevant for criminal offenders who are embedded in criminal groups/gangs. Her point here is that these groups by definition, are social groups with roles and identities, and aspects

of group belonging—belonging to a group comprised of similar social relationships—are highly relevant for understanding desistance.

2.3. Social Networks and Gangs

As summarized above, social structures or networks have a role in gang leaving and disengagement but have not taken a prominent position among gang exit theorists. Social networks can be thought of as representing the intersection between individual and structural factors, in that it is social relations that tie individuals to their environments. Relationships, or connections, are a fact of social life. The individuals, or actors, influence one another and exchange resources. These relationships, and resultant resource exchanges, are crucial in determining the life trajectory of a gang member pre-gang involvement, during, and post-gang involvement. Social ties can reinforce gang identity or help nurture and solidify emerging non-criminal/non-gang identities.

As mentioned in the introduction, in the current study, we are not focused on the gang itself as a network, but instead on the personal social relations of those individuals who are gang members. This "ego" centered approach is designed to determine the influence of each network member (i.e., ego) on the respondent (McCarty 2002). Through an understanding of how individual gang members are tied to their larger social network (which extends beyond their gang friends), research can uncover the types of personal network associations that provide influence on behavior, in this case, the likelihood of remaining in or a leaving a gang, and the lifestyle associated with it. In our review of the literature, there are less than a handful of studies that have examined the ego networks of gang members using self-report methods. Fleisher's (2002) seminal study of teenage and adult female gang members in Champaign, Illinois, found that membership in a gang was more symbolic than real, as many gang individuals had good friends across gang boundaries (i.e., with individuals from different gangs) and exchanged important resources, such as childcare. This was the first study to extensively and systematically measure the personal social relations of gang members through self-report surveys and shed insight into the broader social and cultural milieu of gang members. Surprisingly since then, the characteristics of other social relations of the gang member—or delinquent youth even—have rarely been studied using self-report measures in a network framework (Roman et al. 2016). The recent scholarship on gang members and networks, for the most part, explores very limited ego networks of gang members because the networks are defined by participation or linkage to a criminal incident or event (e.g., arrest or police stop) and/or through administrative or record data (Bouchard and Malm 2016). Administrative data typically only provide a few demographic indicators, such as age, sex, race, and residential location, greatly limiting information on network composition and social roles. For the most part, many of these incident-based studies are built on socio-centric network methods, where the focus is on patterns of the whole group or the organization delineated by the extent of the connections or ties found. Network analysis of this type in the study of gangs as social groups has proliferated, with studies analyzing the ties among gang members and ties across gangs through networks of violence and conflict. That literature, because of the stark differences in aims, is not reviewed here. (See Sierra-Arévalo and Papachristos 2017 for a review).

As stated earlier, the goal of this paper is to provide an in-depth description of the social relations of gang members and how they change (or do not change) after members report they have left their gang. More specifically, we describe the composition of the networks at baseline and changes to network composition at wave 2 associated with varying levels of gang disengagement. We aim to distinguish between gang-leavers who remain attached to their gang peers through continued interaction with their gang peers and those who say they are fully detached and no longer engage with their (ex-) gang peers. In addition to examining the stated reasons for leaving a gang, which may include reasons associated with social networks (e.g., "I made new friends"), the social network data allow us to examine the characteristics of individuals dropped from networks over time and why those network relations were dropped (Feld et al. 2007). We are particularly interested in

the presence and strength of prosocial network relations across the two different levels of disengagement for those who reported leaving their gang between waves.

3. Methods

3.1. Sample and Survey Design

The current study uses survey data from a longitudinal survey and interview project designed to obtain social network data from male and female youth and young adults between the ages of 14 and 25 who were members of street gangs. The study was known as the Connect Survey (Eidson et al. 2017). Data were collected in Philadelphia, Pennsylvania and the District of Columbia (DC). Participants were interviewed three times at least six months apart beginning in mid-2013. Although the project consisted of three waves of data collection, this paper focuses only on the first two waves. The average number of days elapsed between the wave 1 and wave 2 surveys across all respondents was 8.8 months.

Respondents were recruited for Wave 1 by street outreach workers affiliated with gang reduction programs in each city. Outreach workers, most of whom were ex-gang members, were trained to recruit gang youth who they deemed were in a street gang, as generally defined by the components of the Eurogang consensus definition (Weerman et al. 2009), or, regularly hung out with people considered to be in a street gang. There are four main elements to the Eurogang consensus definition: (a) durable: has been in existence for at least several months, (b) street-oriented: spending group time outside of locations that have adult supervision (and does not necessarily have to be on the street); (c) youth: most of the group consists of individuals in their teens and early twenties; and (d) illegal activity is part of its group identity in that behavior is deemed criminal, and not simply bothersome, but is part of the group culture. The research team had a number of conversations with the outreach workers to ascertain whether their definition of street gangs was similar to the criteria to meet the Eurogang definition. Key to the recruitment of study participants was the concept of illegal identity. In both cities, we knew from these discussions that "gang" would not be a typical term used by street groups. Wave 1 survey data revealed that the most common terms group members used for their peer group were "clique" (34%), followed by "crew" (23%). Only 19% referred to their street group as a gang. Other terms used by respondents included "organization" and "squad". To enhance the likelihood that the youth met our street gang definition before they sat down for the survey, the research team used a screening tool to determine final sample inclusion. In addition to the age requirement, the youth had to answer in the affirmative to having a peer group that they currently hang out with and, at minimum, one of the following items: ever involved in at least some type of illegal activity (individual or group activity), have friends in a gang, or calls their peer group a "gang" or "crew". The screening also helped identify individuals who may have been eligible but were unwilling to honestly report their behaviors on a survey—important to a study whose primary focus was examining the process of leaving a gang, thereby necessitating the identification of those in street gangs. Note that the research team did not mandate that the study participants met the official self-reported Eurogang definition of a street gang.

Respondents were invited by outreach workers to meet the research team that day or at a later date to complete a self-guided, computer-based survey. Participation in the survey was voluntary. Parental consent and youth assent were obtained from youth under 18 and individual consent was obtained from those 18 or older. Respondents were paid 50 US dollars at each survey wave.

Recruitment for the study at baseline yielded 229 individuals across the two sites who passed the screening criteria. For the second wave, we employed a variety of methods to attempt to locate survey respondents after the first wave. Each site had at least three core research team members working part-time to re-engage the sample. Efforts included meeting with the outreach workers to expand re-recruitment efforts and find out whether any individuals who took the survey had moved away, were incarcerated, or were otherwise

unable to take the survey. All research protocols were approved by the RAND Corporation human subjects review board.

The response rate for wave 2 reached just under 50% for the sample across both cities; we obtained valid survey data for 112 respondents at wave 2. For the current paper, however, we dropped one respondent who had a high level of missing data across most variables, and as a result, the paper analyzes baseline data on 228 individuals and 111 respondents at wave 2. More details on the recruitment and re-contact/follow-up strategy can be found in Eidson et al. (2017). That paper also includes details on the attrition analyses conducted. The analyses, conducted to determine the relative risk of being lost to follow-up given key baseline demographic characteristics, found the only significant factor to be sex (males were less likely to return) and attachment to work or school (those not attached to either institution were more likely to be lost to follow-up). In addition, there were no significant differences in attrition by site.

Survey data were collected using EgoNet software (McCarty 2003) and Qualtrics (Provo, UT). At each wave, the survey included three sections. The first section included questions about the respondent (or "ego"). Questions were asked about demographic characteristics, living arrangement and environment, work, school and leisure activities, delinquency, group characteristics and involvement, and attitudes toward gangs and gang joining. The second section, the alter section, asked about the respondent's current social network: at each administration, respondents were asked to identify 20 individuals (or "alters") that were important to the respondent and were at least 10 years of age. The alter elicitation text was read as follows: *Please list 20 people important to you and who are at least 10 years old. Start by thinking of the people you hang out with or might see regularly in a typical day. Then, think of the people you talk to or see the most. For example, you can name family members, friends, neighbors, or even people you don't like.* Respondents were encouraged, but not required, to provide 20 names. In total, 87% of the sample listed 20 names, with another 7% listing between 15 and 19 names. Following the identification of network members, respondents were asked a series of questions about each alter. These questions, which capture aspects of network composition, comprise a core component of measuring and understanding personal networks (McCarty 2002). The alter question items are listed in Table 1. In the third section of the survey protocol, respondents were asked about each alter's ties to one another, which results in the information about network structure (not examined in this paper).

The wave 2 survey instrument included an additional component comprised of questions about changes in the lists of alters generated by the respondents between waves. These questions provide important information about the reasons gang members break away from their prior associates and other social relations. These questions allow us to closely examine the reasons behind changing network composition for those who reported leaving their gang and those who did not, as well as give us the opportunity to consider the disengagement process and possible network-based drivers behind crime desistance for individuals. Below we highlight key measures that will be examined in this paper.

Table 1. Connect Survey Question Items about Alters.

1. What are _____'s nicknames or other names that friends and family use to refer to _____?
2. How old is _____?
3. What grade or year is _____?
4. Is _____ male or female?
5. Can you name one thing to describe _____ so that we can tell the difference between this _____ and another _____?
6. Who is _____? (relationship)
7. Does _____ live in your neighborhood?
8. Does _____ live with you?
9. How did you meet _____?
10. Is _____ of Hispanic, Latino, or Spanish origin or descent?
11. What country was _____ born in?
12. How much time do you spend each week hanging out with _____?
13. How much do you like _____?
14. If you needed some information or advice about something, is _____ someone you could go to?
15. How likely is it that _____ carries a gun (including in his/her car)?
16. Has _____ ever sold illegal drugs such as marijuana, cocaine, or crack?
17. How likely is it that _____ has been in a gang fight over the last year?
18. How likely is it that _____ is currently in a gang?
19. How likely is it that you use drugs with _____?
20. How likely is it that you drink alcohol with _____?
21. When you are with _____, what do you do most often?
22. When you are with _____, what else do you do most often?
23. Have you ever in your life committed a crime with _____? Please think of any crime that you know is against the law.
24. How supportive do you think _____ is of you being involved in a group of friends such as a gang or crew that participates in illegal activities such as a gang or crew? If you are not in a group like this or if _____ doesn't know you are, how supportive do you think _____ would be if s/he knew you were in this kind of group?

3.2. Measures

3.2.1. Gang Leaving and Disengagement

The Connect Survey included items to assess whether a respondent left their peer group that was a gang and whether they remained engaged with their group, even if they reported leaving. Respondents were asked about their group that was deemed a gang in wave 1 (their main peer group with whom they engage in illegal activity). At wave 2, we asked respondents to recall the group named at wave 1 (with prompts) and then we asked: *Since the last survey, have you left or quit the group that you described in the survey*? For those respondents who reported having left their wave 1 group, we asked them to describe their current "level of involvement" with that group. There were five response options ranging from "I never participate in anything the group does" to "I participate in nearly everything that the group does". Respondents who reported they never participate in anything were classified as "disengaged", and the other four response options were collapsed and classified as "remaining engaged" in the analyses that follow. It is also important to note that in the remaining narrative, we use the term "group" and "gang" interchangeably.

The wave 2 survey instrument also included a set of 16 questions asking respondents who reported leaving their gang or group why they left. The items are all binary yes/no questions and respondents were directed to choose "all that apply". The question items included I left the group because I/my . . . : (1) found new interests, (2) was bored, (3) something happened of which I wanted no part, (4) wasn't what I thought it was going to be, (5) was hurt, (6) family or friends hurt or killed, (7) got into trouble with the police, (8) went to prison, (9) was forced out, (10) got a job, (11) had/am expecting a baby, (12) parents

made me, (13) partner made me, (14) had an adult encourage me to leave, (15) made new friends, and (16) moved.

3.2.2. Other Group Characteristics

Although not used in analyses in the current study, we included a few measures on group characteristics purely for baseline description purposes. These measures included: (1) Does the group have a territory it claims as its own? (yes/no); (2) in the past six months, has your group provided protection for each other? (yes/no); and (3) in the past six months, has your group defended an area or place against other groups? (yes/no).

3.2.3. Delinquency and Crime

Delinquency and crime were measured at both the individual level and the group level. We asked individuals about their own lifetime participation in crime and recent (past six months) involvement in crime. The individual-level criminal behavior measures included are: (1) sold illegal drugs, (2) motor vehicle theft, (3) participated in a gang fight, (4) carried a weapon without a license, (5) used a weapon or force to steal or rob someone, and (6) attacked someone with a weapon to hurt or kill them. We used these items to construct two sets of binary measures across the crime types for "lifetime" and "recent" involvement. Although not used in analyses, we also included baseline demographic measures for "currently on probation or parole" (yes/no) and whether the respondent was ever arrested for a violent crime (yes/no).

With regard to group involvement in illegal activity, we created a binary measure for any recent group-based crime, which was created from seven binary survey items asking the respondent whether, in the past six months, his/her group had done any of the following: (1) been in fights with gangs/crews, (2) damaged or destroyed property, (3) stolen things, (4) stolen cars or motorcycles, (5) robbed other people, (6) sold marijuana, (7) and sold other illegal drugs.

3.2.4. Personal Network Composition

Composition: Alter Role Characteristics, Exposure to Prosocial Ties, and Exposure to Anti-Social Behavior

Characteristics of the respondent's personal networks with regard to roles and exposure to criminal behavior were operationalized from survey question items that asked about each of the alters named. As listed in Table 1, there were a number of questions that simply asked who the alter is and the type of relationship the alter has with the respondent (how met, how long known, type of relation, age, race, sex, etc.) For the current paper, we focus on three mutually exclusive roles defined from ego-alter ties: family, peers, and mentors. We also create a measure representing tie dispersion across these three different types of ties using Blau's index of heterogeneity ("Blau's H") (Blau 1977). Its computational formula is simply:

$$H = 1 - P_1{}^2 - P_2{}^2 - P_3{}^2 - \ldots \ldots .. - P_r{}^2$$

where P_1 is the proportion of ties in relation *i* members in *r* relation category. Values can range from zero to a maximum of $1 - 1/r$ if each group has the same number of ties. In our study, we measure three types of relations, hence the values range from 0 to 0.67. If all ties are in one group, the value will be 0, versus higher values for more equal distribution across the three types of relations.

To capture network exposure (Valente 2010) to criminal behavior, we utilized the four alter questions about alters' criminal behavior (carry gun, in a gang, co-offend with ego, sell drugs). We used ordinal response categories: "not at all likely" (0); "somewhat likely" (1); "very likely" (2); and "don't know". Response values 1 and 2 were recoded to "1" indicating involvement in the behavior. "Don't know" was recoded as "not at all likely" (or a 0 value) to err on the conservative side. We also included a measure to capture the likelihood that the alter supports the respondent's gang lifestyle.

To create summary personal network measures for these alter variables (with exception of tie dispersion), each binary variable was summed across all alters and divided by the respondent's number of alters, yielding proportional values ranging from 0.00 to 1.00. In summary, these alter compositional and ego-alter tie measures include:

- *Family in network* is the proportion of alters who were listed as a parent/guardian, sibling, cousin, aunt/uncle, or grandparents;
- *Peers in network* is the proportion of alters who were listed as a "friend";
- *Prosocial relations/ties* was defined as ties listed as coaches, teachers, counselors, and outreach workers. This variable was designated "mentorly relations" to distinguish it substantively from other possible prosocial ties (e.g., parents, older siblings, etc.);
- *Tie dispersion* across peer, family, and, mentorly relations;
- *Same household relations* is the proportion of alters who live in the respondent's household;
- *Same neighborhood relations* is the proportion of alters who live in the same neighborhood;
- *Gun carrying alters* is the proportion of alters where respondent indicated very likely or somewhat likely to carry a gun;
- *Alters in a gang* is the proportion of alters where respondent indicated very likely or somewhat likely to currently be in a gang;
- *Co-offenders* is the proportion of alters where respondent indicated "ever committed crime with". Note that the response options provided were yes/no;
- *Drug-selling alters* is the proportion of alters where respondent indicated that alter very likely or somewhat likely sells illegal drugs;
- *Supports gang lifestyle of respondent* is the proportion of all alters who were somewhat likely or very likely to support the gang lifestyle of the respondent, as reported by the respondent. (Respondents were not provided a "don't know" option).

Composition: Strength of Network Ties

Following research by Granovetter (1983) and other network scholars (Mathews K. Michael et al. 1998; Wellman and Wortley 1990), we also included three measures representing the strength of network ties. Granovetter asserts that tie strength generally includes four properties: amount of time spent with someone; emotional intensity of the relationship, intimacy (e.g., friend vs. best friend), and whether reciprocal services are provided or the relationship itself is reciprocated. Other theorists and researchers have suggested that plausible indicators of tie strength also include emotional support or advice given and/or received. A measure of "high interaction alter" was created from the item asking about how much time is spent with the alter. Response options ranged from every day to "don't really ever see this person". A high-interaction relation was designated where the respondent stated they see the alter "every day". Alters were also designated an "advice network relation" when a respondent stated they go to that individual for advice (response options were "yes/no"). Last, a dichotomous measure for "dislikable relation" was created for each alter when a respondent, when asked: How much do you like person X? (a whole lot, some, not at all), reported they did not like an alter. This measure was included because prior research by Fleisher (2002) has shown that not all gang members like their gang peers and these adverse relationships may correlate to reasons for leaving a gang.

3.2.5. Changes in Social Networks

To understand a range of possible differences between the social relations elicited at each wave of the survey, at wave 2, respondents were first asked to name 20 alters, using the same questions to elicit alters as used for wave 1. Respondents were shown their wave 1 alter list only after they had finished naming alters for wave 2. Respondents were then asked to compare their wave 1 and wave 2 lists and identify the individuals that were the same at each wave, those wave 1 alters who had been dropped by wave 2, and any

individuals who were new at wave 2. If respondents had dropped alters at wave 2, we then asked individuals a series of questions about why they did not name that person.

3.2.6. Demographics

Basic demographic variables include age, sex, ethnicity (Latino = 1), marital/significant relationship status, and site (DC = 1; Philadelphia = 0). Because the sample age range was wide (14 to 25 years of age), to measure attachment to the traditional institutions of school or work, we combined two items to form a dichotomous measure as to whether the respondent was either in school or employed. If either, the variable was coded "1". We created a variable indicating whether a respondent lived with his/her parents and/or other family members (e.g., siblings, cousins, aunts/uncles, and grandparents). We also created binary variables indicating whether the respondent had children and if so, whether they provided financial support for the children.

3.3. Analytic Strategy

In order to provide useful information about the personal relationships of those respondents who reported leaving their group and the changes specific to their networks over the elapsed time between waves 1 and 2 (roughly nine months), we first provide descriptive information on the full baseline sample and those who reported leaving their group, and then we examine any differences between those who reported leaving but still hang out with members of their group ("engaged") versus those who left but do not associate with their old gang peers or participate in their activities ("disengaged"). We provide tables to then highlight the reported reasons for leaving their group as well as why some network members disappeared from the ego networks between waves and focus on changes across the range of network composition variables. We do this by making use of descriptive statistics (i.e., measures of frequency, central tendency, and dispersion), and where appropriate, utilize *t*-tests to determine significant differences in network compositional factors between waves. Where relevant, we examine differences between self-reported group-leavers who remain engaged with their group versus those reporting being fully disengaged. With regard to missing data, when a respondent had missing values for key measures, we dropped the respondent(s) with missing data from the particular statistical calculation and noted missing in the table. We chose not to conduct imputation given that our analyses are descriptive and we wanted to provide an accurate representation in the descriptive portrait.

Given the salience of social networks in the recent desistance literature as possible "hooks for change" (Giordano et al. 2015; Weaver 2016), we expect to see a number of network changes at wave 2 for those individuals who have completely disengaged. Specifically, we hypothesize that for those respondents who reported they left their group and no longer participate in that group's activities, there will be more network members dropped between waves, and an increase in the proportion of network members considered prosocial ("mentorly"), as compared to those who remain engaged. For those who are fully disengaged, we also expect a reduction in network members who are peers and reductions in members who support the respondent's "gang lifestyle". We expect that any reduction in peers translates to an increase in network members who are parents or considered family because, in the short time between waves, it is not likely that respondents gain new friendships that have solidified enough to be easily named at wave 2. We also examine the reasons why some of our respondents' relations were not named at wave 2 and whether the reasons differed across disengaged group-leavers versus those who remain participants in group-based activities of the group they reported leaving. Here, we expect that group-disengaged respondents will be more likely to report that they have new friends, or their "old" friends did something they did not like or did not want to be a part of, or hung out with people they do not like, than those who reported leaving their group, but still participate in things the group does.

4. Results

4.1. Baseline Characteristics

Table 2 provides demographic characteristics of respondents at baseline (i.e., wave 1) including the individual-level offending and group-based characteristics of the sample. With regard to individual-level offending, no more than half the sample reported ever engaging in the following criminal activities: sold drugs (40%), stole a motor vehicle (30%), robbery (47%), aggravated assault ("attacked someone to serious hurt/kill"—46%). Roughly one-third of the sample had been arrested for a violent crime at some time in their life, and one-third reported being on probation or parole at baseline. Nearly 70% of respondents at baseline reported that they belonged to a group that committed, in the last six months, at least one group-based illegal activity.

Table 2. Demographic Characteristics of Sample at Baseline, n = 228.

	Wave 1	N
Demographics		
Philadelphia site (versus DC)	57.89%	228
Average age	19.35	228
Male	65.07%	228
African American	64.91%	228
Hispanic/Latino(a)	19.74%	227
Married or in serious relationship	35.37%	228
Has child(ren)	31.0%	228
Of those with children, supports them	60.0%	228
Lives with parents and/or other family	83.41%	228
In school or has job	59.03%	227
Individual offending and group behavior		
Sold drugs	40.27%	226
Stole a motor vehicle	30.09%	226
Carried a gun, last 6 months	34.65%	227
Used force or weapon to rob	47.35%	226
Attacked someone to seriously hurt, kill	46.02%	226
Gang fight	58.41%	226
Arrested for robbery or aggravated assault	32.02%	227
On probation or parole	34.80%	227
Group has committed any of 7 crimes, [a] last 6 months	69.91%	225
Group claims territory	58.22%	225
Group protected each other, last 6 months	76.44%	225
Group defended an area against other groups, last 6 months	52.89%	225

Notes: [a] Group crimes include: gang fights, property damage, theft, auto theft, robbery, sold marijuana, and sold other illegal drugs.

Table 3 provides descriptive information on the composition of the respondents' ego networks. The values aggregate the average proportion of alters in each respondent's network with those characteristics. The table also shows frequencies for respondents reporting zero alters with the listed characteristics, as well as those reporting that all (100%) of their alters possessed that characteristic. As discussed in the measures section, these characteristics are those as described (i.e., reported on) by the ego; this study did not collect information directly from alters. On average at wave 1, respondents' networks were majority male (0.67) and African American (0.76), reflecting the makeup of the respondents themselves. One quarter of ego networks were, on average, comprised of alters reported to be Latinx. In general, respondents reported networks that were roughly half family; similarly, networks, on average, were half peers. A sum of 27 respondents (12%) reported that none of their alters were peers. This roughly corresponds to the number of alters who reported that their entire network was comprised of family members (23 respondents). Respondents, on average, spent a lot of time with just over half of their network members (0.59) and would go to roughly the same proportion for advice (0.60). Only four respondents (roughly 2%) reported that there was no one in their network they went to for advice. On average, ego networks were comprised of very few alters who were disliked by respondents (0.11) and even lower proportion (0.01), on average, were listed as

coaches, teachers, counselors, or outreach workers—"mentorly". A large majority reported having no (0) mentorly alters (89%).

Table 3. Compositional Characteristics and Network Exposure at Wave 1, n = 227 [a].

Respondents' Alters Who …	Average Proportion [b] (S.D.)	Freq. Reporting No (0) Alters with Characteristic No. (%)	Freq. Reporting All Alters with Characteristic No. (%)
Are male	0.67 (0.26)	5 (2.20%)	32 (14.10%)
Are African American	0.76 (0.31)	12 (5.29)	67 (29.52)
Are Hispanic/Latino	0.27 (0.31)	62 (27.31)	7 (3.08%)
Are respondent's parents	0.06 (0.11)	124 (54.63)	0
Are family	0.45 (0.34)	21 (9.25)	23 (10.13)
Are peers	0.46 (0.31)	27 (11.89)	5 (2.20)
Are mentorly	0.01 (0.03)	201 (88.55)	0
Live with respondent	0.17 (0.21)	62 (27.31)	1 (0.44)
Carry a gun	0.39 (0.34)	41 (18.06)	13 (5.73)
Is in a gang	0.28 (0.30)	62 (27.31)	6 (2.64)
Commit crimes with respondent	0.27 (0.32)	76 (33.48)	8 (3.52)
Sell drugs	0.29 (0.31)	53 (23.35)	9 (3.96)
Are supportive gang lifestyle	0.62 (0.34)	18 (7.93)	44 (19.38)
You spend lots of time with	0.59 (0.28)	2 (0.90)	21 (9.42)
You go to for advice	0.60 (0.27)	4 (1.79)	17 (7.62)
You do not like	0.11 (0.17)	97 (42.73)	0
Lives in neighborhood	0.49 (0.27)	7 (3.08)	7 (3.08)
Tie dispersion [c] (family, peers, mentors)	0.29 (0.19)	-	-

Notes: [a] Alter values missing for one respondent. [b] With the exception of tie dispersion, values are central tendencies calculated as the average proportion of each characteristic across all respondents' ego networks. S.D., standard deviation. [c] Tie dispersion is the mean value across all respondents, with values ranging from 0 to 0.67.

Although the proportion of mentorly alters was low on average across networks, ego networks were not fully comprised of relations who would support a respondent's gang lifestyle. The average proportion of ego networks made up of relations who would support their gang lifestyle was 0.62, indicating that at least a third, on average, do not support the respondent's gang lifestyle. Nonetheless, on average a quarter to one-third of one's network was likely to be engaged in some type of criminal behavior (carrying an illegal gun, in a gang, committing crimes as a co-offender, or selling drugs). Eight respondents reported that their entire network was comprised of individuals they commit crimes with.

4.2. Gang Leaving and Disengagement

Turning now to wave 2, Table 4 shows that just under 30% of respondents (n = 30) self-reported leaving their group. Of those 30 who reported leaving, 13 (43%) reported that they did not participate in anything that their wave 1 group did ("disengaged"), with 17 (57%) reporting they participate in some to all of the things their group does ("engaged").

Table 4. Gang-leaving and Disengagement at Wave 2, n = 111.

	Freq.	*Percent*
Self-reported left W1 group	30	27.68%
Self-reported left W1 group and never participates in anything group does	13	43.33%
Self-reported left W1 group but continues to participate in things group does	17	56.67%

Because an important substantive question among gang scholars has been whether levels of post-gang-leaving engagement signify changes in criminal activity, we first examine differences in individual-level criminal behavior between waves for gang-leavers compared to non-gang-leavers (Table 5). The statistics reported here at both waves only include those individuals who completed wave 2. The table then breaks down the gang-leavers between those who disengaged from group activities versus those who remained tied to their groups. When the disengaged versus engaged respondents are not disaggregated, looking solely at group-leavers, there are no noticeable changes in participation in criminal activity between waves 1 and 2. For those remaining in their groups (n = 80), there were a number of changes at wave 2, with more individuals selling drugs, stealing cars, carrying a gun, robbing and assaulting people in the time between wave 1 and wave 2 than in

the six months before wave 1. The lower half of the table shows a general withdrawal from criminal activity by those reporting they were fully disengaged from their groups. In contrast, across a number of crime types, those who reported leaving their groups but not disentangling themselves from group activity reported more participation at wave 2 (compared to wave 1) for all crime types except robbery.

Table 5. Changes in Offending Between Wave 1 and Wave 2, Group-Leavers and Non-Leavers.

	Group-Leavers (n = 30)		Non-Leavers (n = 80) [a]	
	Wave 1 %	Wave 2 %	Wave 1 %	Wave 2 %
Individual offending behavior, last 6 months				
Sold drugs	23.33	23.33	16.25	39.24
Stole a motor vehicle	20.00	23.33	8.75	20.25
Carried a gun, last 6 months	33.33	33.33	26.25	31.65
Used force or weapon to rob	30.00	26.67	27.50	18.99
Attacked someone to seriously hurt, kill	36.67	36.67	30.00	32.91
Gang fight	33.33	26.67	22.50	27.85

[a] Missing data on one individual.

Gang-leavers, broken down by engagement: (last 6 months)	Disengaged (n = 13)		Still engaged (n = 17)	
	Wave 1 %	Wave 2 %	Wave 1 %	Wave 2 %
Sold drugs	23.08	7.69	23.53	35.29
Stole a motor vehicle	23.08	7.69	17.65	25.29
Carried a gun	38.46	7.69	29.41	52.94
Used force or weapon to rob	30.77	7.69	35.29	41.18
Attacked someone to seriously hurt, kill	46.15	15.38	29.41	52.94
Gang fight	30.77	0	35.29	47.06

We examined further the differences between disengaged gang-leavers and engaged gang-leavers by assessing their reported reasons for leaving the group. Recall from the measures section that respondents were given a list of 16 possible reasons they could have left their group and were asked to choose all that apply. The results, shown in Table 6 highlight a number of differences between the disengaged group-leavers and those that remain involved. Interestingly, all reasons except "an adult encouraged me" were represented by a higher percentage of engaged group-leavers than disengaged. Engaged leavers were also more likely to choose more reasons (as opposed to fewer) for leaving than disengaged leavers.

Table 6. Reasons for Leaving [a] Self-Reported Group-Leavers, Disengaged vs. Engaged.

	Does Not Participate n = 13	Remains a Participant n = 17
Push Reasons for Leaving [b]		
Found new interests	53.85%	76.47%
Bored	30.77	47.06
It wasn't what I thought	30.77	52.94
Something happened I didn't like	38.46	47.06
Was hurt	7.69	41.18
Friends/family hurt	7.69	58.82
Police harassment/pressure	15.38	41.18
Went to prison/jail	15.38	41.18
Forced out by group	7.69	23.53
Pull Reasons for Leaving [b]		
Got a job	23.08	64.71
Expecting a baby/had a baby	38.46	52.94
Made new friends	38.46	52.94
Moved (home or school)	7.69	35.29
Parent(s) made me	15.38	25.29
Significant other made me	23.08	52.94
Adult encouraged me to leave	46.15	29.41
Summary		
Total pushes (mean)	2.08	4.29
Total pulls (mean)	1.92	3.24
% respondents listing pushes only	7.69%	0
% respondents listing pulls only	7.69%	0

[a] Reasons for leaving group are not mutually exclusive; respondents could choose all that apply. [b] Percentages in rows are based on valid responses.

4.3. Changes in Network Composition

Table 7 provides information on how ego networks changed across waves for those group-leavers who fully disengaged from their group, compared to those who remained involved. Not surprisingly, group leaving corresponded to a large percentage of alters from wave 1 being dropped by wave 2. On average, disengaged group-leavers dropped 76% of their alters, whereas engaged group-leavers dropped a bit lower percentage at 64%. However, some alters were dropped simply because respondents forgot about them or their social networks may have comprised more than 20 relations and had not yet listed that person who had been listed in wave 1 (the survey protocol capped alters at 20). After "forgot to name that person", for disengaged gang-leavers, the next most frequent reason that an individual was dropped from a respondent's network was "changed group of friends" (15%), and alter "moved" (12%). Notably, fewer engaged group-leavers than disengaged leavers reported they changed their group of friends (8%). Another prominent difference between disengaged and engaged gang-leavers was the percentage of alters who respondents reported they had completely severed ties with (i.e., the relationship is over): 39% for disengaged gang-leavers versus 23% for those leavers who remained engaged with their gang peers.

Table 7. Reasons Why Respondents' Dropped Alters at Wave 2, Group-leavers, Disengaged versus Engaged, Averaged Across Ego Networks.

	Leavers, Disengaged n = 13	Leavers, Still Engaged n = 17
Avg. number of W1 alters dropped by W2	13.92	12.71
Avg. percent of W1 alters dropped by W2	75.65%	63.92%
At W2, I didn't name that W1 person because . . . [a]		
. . . I forgot to name that person	38.02%	28.69%
. . . I already named 20 people	6.00	14.36
. . . that person did something I don't like	4.64	4.93
. . . I changed my group of friends	15.07	7.88
. . . that person moved	12.19	11.12
. . . I don't like that person	2.14	2.28
. . . that person hangs out with people I don't like	7.83	2.73
. . . that person is an ex-boy/girlfriend	0	2.45
. . . we grew apart	1.56	1.88
. . . that person is in jail/prison	1.71	2.65
. . . that person is deceased	0	0
Relationship is over	39.25%	23.17%

[a] Respondents could select more than one reason for dropping an alter at wave 2.

The last set of analyses utilize *t*-tests to examine significant changes in the composition of networks between the two waves. Significance tests were set up as single sample tests to examine changes to personal network composition for respondents within each category of gang-leaver over the two waves. We test the null hypothesis that change equals zero. The results of the *t*-tests (Table 8) show that for disengaged group-leavers, there are a number of significant differences pertaining to changes in network composition that occurred between waves. At wave 2, compared to wave 1, disengaged group-leavers were significantly more likely to name parents as social ties and people with mentorship roles (i.e., coaches, teachers, outreach workers, and counselors). This increase in relations designated parents and mentors by respondents was accompanied by a decrease in alters designated as peers (though this decrease was not significant) and an overall significant increase in tie dispersion across family, peer, and mentorly relations.

Table 8. Changes in Composition of Respondents' Networks between Waves.

Average Change in Proportion [a] of Respondents' Alters Who . . .	Leavers, Disengaged n = 13	Leavers, Still Engaged n = 17
Are respondent's parents	0.13 *	−0.04
Are family	−0.03	−0.12
Are peers	−0.14	0.29 [†]
Are mentorly	0.40 ***	0.28 ***
Live with respondent	0.00	−0.01
Carry a gun	−0.20	0.05
Is in a gang	−0.31 **	0.05
Commit crimes with respondent	−0.16	0.06
Sell drugs	−0.24 *	0.03
Are supportive gang lifestyle	−0.16	0.08
You spend lots of time with	−0.09	−0.11
You go to for advice	−0.03	0.00
You do not like	−0.10	−0.02
Lives in neighborhood	−0.08	−0.09
Tie dispersion (family, peers, mentors)	0.13 *	0.33 ***

Notes: [a] With the exception of the tie dispersion measure, values are the average change between waves in the average proportion of characteristics across respondents' ego networks. *t*-tests were calculated separately for each group (as single sample *t*-tests for disengaged and engaged, respectively) testing the hypothesis that change in means between waves was equal to 0. [†] $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Group-disengaged respondents were less likely to name alters who were in a gang, co-offenders, sold drugs, and supported their gang lifestyle, though only *alters in a gang* and *alter sold drugs* reached statistical significance. Very notably, for those who reported leaving their group but were not disengaged, there were no decreases in the proportion of social ties with any of the compositional attributes related to criminal behavior. There was a significant increase in mentorly ties for those not fully disengaged, but this increase was not as steep as the increase for those fully disengaged from their group. Furthermore, the number of peers increased and these changes in relation types likely influenced the change in tie dispersion, with a significant mean change in the dispersion of 0.33. It is not likely that the peers added to the networks of the still-engaged gang-leavers in wave 2 were positive role models, because the change statistic for the proportion of alters supportive of gang lifestyle increased.

Overall, given the apparently reduced exposure to criminal behavior and large increase in mentorly and parental ties for the fully disengaged respondents, compared to the minimal positive changes for those who remained engaged, these results confirm our hypotheses that a complete withdrawal from interaction with old gang members is the status or state that is likely accompanied by large changes in the composition of social networks. These changes are in the prosocial direction—toward shedding anti-social ties and increasing the number or proportion of ties that can offer positive opportunities and perhaps, life-changing opportunities.

5. Limitations

Before we discuss the findings, there are study limitations to mention. First, the current study does not draw from a random sample of gang members; hence the findings are not representative of the street gang population in the United States nor of street gangs in Philadelphia or DC. Relatedly, with regard to generalizing, the findings of our study are dependent on how network ties were elicited and defined. Our study specifically and purposely asked respondents to name 20 social relations—broad and not role-based (i.e., parent, friend, relative, etc.—who are important to them. Though not all respondents named 20, the vast majority did (88%), creating a larger ego network than is typical in network studies from any social science field involving youth and young adults (with the exception of studies about *online* relations). Second, we had roughly 50% attrition at wave 2,

but we are confident, given the attrition analyses (Eidson et al. 2017) and a deeper, informal, qualitative assessment of who could not be reach for follow-up, that the attrition was not biased in a way that would affect the analyses conducted. Third, alter characteristics were operationalized through reports by the egos, not the alters themselves; some researchers have questioned the utility of these types of perceptual measures in network studies and the tendency for youth to overestimate their peers' behaviors (Baerveldt et al. 2004). However, a study examining this particular issue (Young and Weerman 2013) found that perceptions are an important factor in peer and group-based behavior and that the network approach eliciting perceptions about social ties remains a valid approach to social inquiry of peer behaviors. The authors found that overestimation of friends' deviant behavior may even be a cause of one's own deviant behavior.

Forth, the survey techniques used in the Connect Survey do not provide information on the exact timing of when respondents de-identified as a part of the gang peer group after wave 1. Hence, we cannot establish a temporal ordering in group leaving and changes in ego networks. Future quantitative and qualitative network research on gang disengagement could collect survey data using a monthly calendaring data collection tool to help unpack disengagement and crime desistance processes and temporal ordering. Last, our study only provides a short time span (under one year) from which to examine the process of gang disengagement. We were unable to draw associations to aspects and constructs discussed in Decker et al.'s (2014) study of role transitions and the stages of gang exit (such as post-exit validation). Given that studies show youth can move back into gangs (i.e., re-identify as gang members or join another gang) after periods of disengagement, it is possible that even our study's 13 fully-disengaged former group members re-identify as group members at some future point in time.

6. Discussion

This two-site study was designed to describe the network composition of gang members and former gang members as they move through the process of disengagement and crime desistance. Even with the limitations outlined above, we view this study as a step toward advancing research on gang disengagement and desistance. Although the sample was relatively small and purposive, we were able to successfully recruit and collect a range of detailed social network data from the youth and young adults who typically are not part of the longitudinal studies cited in criminology because they are not attached to social institutions or are simply hard-to-reach through representative sampling frames.

Among the individuals who were retained at wave 2, 30 (28%) reported leaving their gang by wave 2. But not all respondents stopped participating in their wave 1 peer group's activities—of the 30 individuals who left their group, 57% continued to be involved with their wave 1 group, whereas 43% were fully disengaged. Our analyses revealed stark differences in criminal behavior and changes in network composition at wave 2 by engagement level. Furthermore, these differences between groups *by level of engagement* were much greater than differences assessed by gang membership status. This finding clearly reemphasizes the growing agreement that leaving the gang is an important process to be studied and that, not surprisingly, crime desistance is more clearly tied to full disengagement than de-identification as a member of a gang. This aligns with the markers of identity change highlighted by Paternoster and Bushway (2009): (a) crystallization of discontent, (b) changes in institutional/social relationships, and (c) a "break from the past" in that the fully disengaged gang-leavers in our study clearly made a break from the past, and this break was associated with significant shifts in social relationships.

These findings have implications for theorizing about crime desistance. As discussed in the background literature section of this paper, the role of social relations in desistance theories is largely relegated to a minor facet in theories or subsumed under the larger umbrella of social structure. Studies testing Weaver's ideas incorporating relational sociology (2016) could open avenues to more deeply examining how various ties and tie structure engender changes in identity in relation to gang and crime desistance. The work of Warr

([1996](#)) on peers and changes in peer relationships is also relevant here. He found that when holding peer influence constant, the effect of age on crime and desistance for the most part disappeared. This finding emphasizes relationships and suggests that decreasing exposure to delinquent peers is important for reducing crime. Related to the current study, changes in peer relationships may occur due to the increasing salience of adult role models in the lives of youth—possibly those adults who encourage offenders and former offenders to leave a life of crime, and in our case *leave the gang*. This line of research focused more squarely on personal social relations, may be integral to understanding the criminal trajectories of gang members. Indeed, a social network approach specifically capitalizes on the fact that each network member does not contribute equally to the respondent's behavior.

With regard to the various roles of social relations, significant others may have less influence than other prosocial-oriented adults (Table 6), as the influence of significant others was provided as a reason for leaving a gang by those who remained engaged after leaving, but not nearly as often by those who had fully disengaged. Additionally and notably, those who were fully disengaged provided fewer reasons for leaving—this is telling for the relative importance of adult encouragement for those who fully disengaged from their wave 1 group. It may be that, for our sample, recruited by street outreach workers who are actively working to mentor youth and young adults and reduce youth engagement in violence, that the large significant increase in the proportion of mentorly alters at wave 2 for those disengaged (Table 8) can be attributed to the work of those outreach workers. These mentorly alters could be the adults who encouraged the respondents to leave their group.

Not surprisingly, these findings related to increases in mentorly network ties imply that programs that use street outreach workers, such as the Cure Violence Public Health Model, may be effective strategies to reduce violence and turn high-risk individuals and gang members onto prosocial paths. Cure Violence, which originated in Chicago, is a public health-based gun violence reduction strategy that seeks to reduce community-levels of gun violence through direct work with individuals ([Butts et al. 2015](#)). The model does not focus on gang members per se, but the eligibility criteria focus on high-risk individuals who have been involved in violence and the criminal justice system likely includes a large number of street gang members. Butts and colleagues' review of the evaluation research on Cure Violence indicates that the model has been effective, for the most part, when implemented with fidelity. Evaluation studies published since their review also show success (see for example, [Roman et al. 2018](#)). The current study also has policy implications that would support the importance of programs that buoy family structures, specifically strengthening the relationship between youth and their parents/caregivers.

In conclusion, future gang studies should include longitudinal, broad survey methods that incorporate ego-network data collection with qualitative interviews and other survey methods and techniques that will help inform the temporal ordering of gang de-identification, disengagement, and crime desistance alongside changes in both network composition and structure. Although an expensive endeavor, longitudinal surveys that enable a comprehensive set of data on a range of social ties would provide unlimited opportunities to examine a host of potentially significant factors associated with gang disengagement and crime desistance. Furthermore, an assessment of the structural aspects of ego networks—such as density, number of components, centralization—factors not examined in this study, would potentially advance theoretical work and provide additional insight for gang intervention and violence reduction.

7. Materials and Methods

Survey protocols are available by request from the first author.

Author Contributions: Conceptualization, funding acquisition, and project administration: C.G.R. and M.C.; methodology, C.G.R. and M.C.; data cleaning and validation, M.C. and C.G.R.; final analyses for tables, C.G.R.; writing: original draft preparation, C.G.R., M.C., and L.R.M. (literature

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Article

Social Media and the Variable Impact of Violence Reduction Interventions: Re-Examining Focused Deterrence in Philadelphia

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Abstract: Focused deterrence is a gang violence reduction strategy that relies on a unique mix of strong enforcement messages from law enforcement and judicial officials coupled with the promise of additional services. At the heart of the intervention is a coordinated effort to communicate the costs and consequences of gun violence to identified gang members during face-to-face meetings and additional community messaging. In Philadelphia, focused deterrence was implemented between 2013 and 2016, and although an impact evaluation showed a significant decrease in shootings in targeted areas relative to matched comparison neighborhoods, the effect on targeted gangs was not universal, with some exhibiting no change or an increase in gun-related activity. Here, we employ data on group-level social media usage and content to examine the correlations with gun violence. We find that several factors, including the nature of social media activity by the gang (e.g., extent of activity and who is engaging), are associated with increases in the average rate of gang-attributable shootings during the evaluation period, while content-specific variables (e.g., direct threats towards rivals and law enforcement) were not associated with increases in shootings. Implications for violence reduction policy, including the implementation of focused deterrence, are discussed.

Keywords: gangs; violence; shootings; social media; focused deterrence; intervention

1. Introduction

Taking on a variety of expressive and pragmatic roles, gang violence, especially involving guns, presents a persistent challenge for law enforcement and communities worldwide (Decker et al. 2021). Violence is often directed at other gangs and is the result of rivalries over activities, territory, or perceptions of respect (Nakamura et al. 2020). Effective strategies to reduce violence are rare and difficult to generalize owing to the unique characteristics of gangs and their environments (Braga et al. 2006). A growing body of research has found that focused deterrence, more recently known as the Group Violence Intervention, can be effective in reducing gang violence (Braga et al. 2018). However, gangs subject to focused deterrence may adapt differently depending on certain factors (Roman et al. 2019). The current study seeks to explore one group of factors that may be associated with the differential responses to focused deterrence observed in Philadelphia, USA: the influence of social media. Social media are increasingly recognized as potentially playing a role in exacerbating gang violence (Patton et al. 2019), and there are unexplored theoretical reasons to believe its use may impact the efficacy of an intervention liked focused deterrence. To examine this relationship, we uniquely link real-world data on gang-specific shooting rates to the nature and intensity of social media usage by those same gangs. We begin by locating the current study in the existing literature on focused deterrence, gang violence, and social media.

2. Focused Deterrence and the Philadelphia Experience

Focused deterrence, an approach in which many "levers" are "pulled" to discourage gangs from engaging in violence, was developed in Boston in the late 1990s (See Kennedy et al. 1996). In the initial model, called Operation Ceasefire (Kennedy et al. 2001), these "levers" consisted of formal agency-level responses from prosecution, law enforcement, and probation, among others, and of offering educational, employment, and social service support. The risks of engaging in violence, and the benefits of abstaining, were communicated to key gang-involved individuals at "call in" meetings. Importantly, these individuals were then instructed to share these messages with other members of their gang.

In Philadelphia, focused deterrence was first implemented in 2013 with "call in" meetings and surveillance and enforcement actions (the unified response to non-compliant participating gangs) running through 2016. Conceived as a multi-agency partnership involving the Philadelphia District Attorney's Office, the Philadelphia Police Department (PPD), the Adult Probation and Parole Department, the First Judicial District (i.e., the local court system), Juvenile Probation, and the Mayor's Office of Criminal Justice, among others, the program largely followed the original Boston model. This meant that the "levers" included increased requests for high bail (by the prosecutor), adjustment of the requirements of community supervision (by adult probation; see Roman et al. 2020 for more context), and the execution of outstaying warrants (by various law enforcement partners). Additionally, unique levers in Philadelphia encouraged rapid responses to utility theft, accumulated non-payment for services (e.g., cable and internet), child support obligations, and a review of public housing subsidies. Social services, coordinated by the Mayor's Office, were also offered to all gang members who were engaging with the program (see Roman et al. 2019, 2020, for additional descriptions of the implementation processes). Throughout the intervention, 14 gangs were the subject of the focused deterrence evaluation.

The "pulling levers" approach on which Philadelphia's intervention was modeled has been replicated and evaluated multiple times, including in Boston and other jurisdictions across the United States and Western Europe. Research has shown that focused deterrence can reduce crime. Recent studies have shown associated reductions in violence observed in large (e.g., Los Angeles; Tita et al. 2003), medium (e.g., New Orleans; Corsaro and Engel 2015), and smaller (e.g., Lowell (MA); Braga 2008) cities. Its adaptation in Glasgow, Scotland, derived from a version of the model in Cincinnati, is credited with large reductions in serious youth violence (Deuchar 2013; Graham 2016; Williams et al. 2014). One systematic review aggregated the most rigorous of these jurisdiction-level studies (n = 10) and found that 90% of them identified a statistically significant reduction in crime attributable to the intervention (Braga and Weisburd 2012). A more recent review by the same authors found smaller but significant reductions in violence, though variation in impact by program type, goal, and outcomes was identifiable due to the larger sample size (n = 24) (Braga et al. 2018). The evaluations of the sites that implemented programs focused specifically on gangs (as opposed to individuals or drug markets) witnessed the largest effects.

Fewer studies have sought to examine how specific gangs responded to focused deterrence. Braga et al. (2014), for example, employed a quasi-experimental approach in Boston to compare a sample of comparison gangs that were similar to the targeted gangs but that were not subject to the intervention themselves. A side-by-side comparison showed that the shootings among the participating gangs decreased by 31%, a statistically significant reduction. Similar results were identified in Chicago, where the gangs that participated in a "call-in" demonstrated a 23% reduction in shootings (Papachristos and Kirk 2015).

The evaluation in Philadelphia followed the model employed by Braga et al. (2018) and sought to identify not only the community-wide impact of the strategy on gun violence but also assess the impact at the gang level (Roman et al. 2019). In Philadelphia, all the targeted gangs resided in the same region of the city. They employed a propensity scoring and matching design to pair communities where the gangs were involved in focused deterrence with similar neighborhoods, including in terms of baseline violence, gang

activity, and socio-demographics, where the gangs were not selected for participation. The community-level difference-in-differences results showed a statistically significant reduction in shootings in the 24 months after the implementation of focused deterrence when compared to the matched comparison areas. The gang-specific analyses focused on two metrics: the number of shootings in the geographic area(s) associated with the targeted gangs as well as the number of shootings in which an identified member of a given gang was identified as the perpetrator. Although shootings in the areas associated with the targeted gangs decreased more than the comparison gangs' areas (which also decreased, to a lesser extent), these findings did not reach statistical significance. A descriptive examination of the average change per quarter of the number of with a gang-identified perpetrator highlights one potential challenge (Figure 1, below). Of the 14 gangs that participated, the majority responded positively to focused deterrence, as was anticipated. However, three gangs bucked that trend and were associated with more shootings after efforts were made to prevent violence; the intervention backfired for those gangs. One gang had neither a reduction in shootings nor an increase.
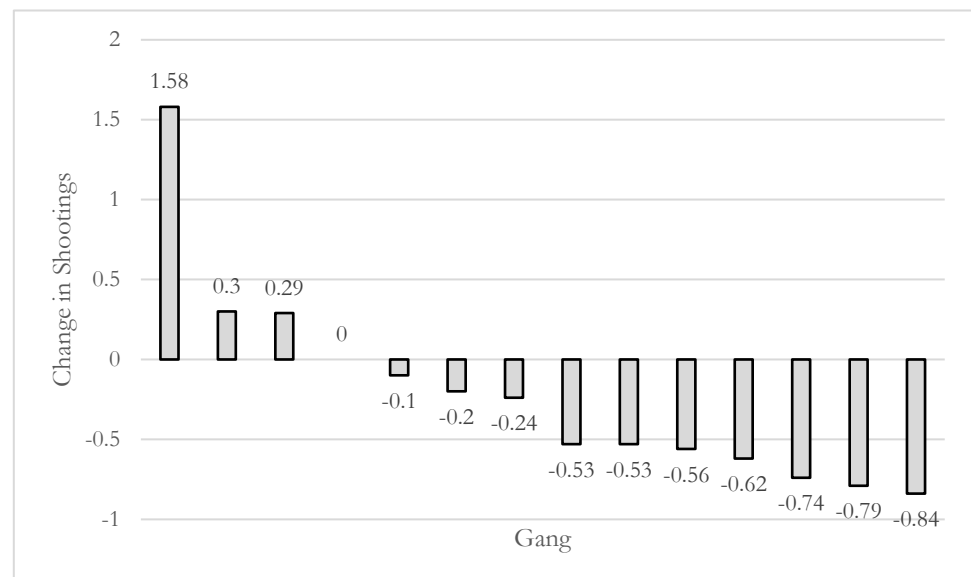
Figure 1. Average change per quarter in counts of gang-related (by known perpetrator) shootings (n = 14). Note: Post period for each gang begins in the first quarter that the gang was "called in".

In considering these findings, Roman and colleagues noted that even when targeted with the same, generally effective strategy, gangs may not always respond the same way (Roman et al. 2019). One possible source of this variable response may be the extent to which gangs differentially engaged with social media, especially concerning threatening rhetoric that could lead to intra-gang violence. In other words, gangs more likely to be using social media as a venue for communication may be less likely to pay attention to the deterrent message of focused deterrence—a lesson that centers on reinforcing a sense of collective accountability. Similarly, high levels of this type of online activity could bring a gang into virtual contact with other gangs or individuals engaged in illegal activity that they would not otherwise encounter; these increased opportunities for confrontation could translate into street-based violence if the gangs fight or if they collude to commit new crimes. Alternatively, the online and physical worlds may not overlap in this space; social media activity may function independently from face-to-face actions. In the current inquiry, we seek to develop preliminary evidence on this dynamic, though we first consider the theoretical and practical landscape.

3. Gang Violence on Social Media

Social media have become a dominant force in modern public discourse in just over two decades (Dewing 2010; Zuboff 2018). Since their inception, social media sites have been designed to encourage and facilitate interpersonal communication using videos, pictures, and written messages; regulation of illegal content has been largely ineffective at preventing the dissemination of violent rhetoric and, in some cases, actions (Bock 2012; Patton et al. 2013). This has resulted in the creation of an online extension of the physical world where friends and rivals can speak directly; street gangs have expanded their traditional means of communication (Goldman et al. 2014) to adapt to this new reality. The impact of the shift from the physical to the virtual world, especially within the context of social media, can impact the psychological and social dynamics of communication, often requiring a real-world response (see, e.g., Fedushko et al. 2021).

There has been an explosion of research examining gangs' use of the internet in the last decade (for reviews, see Densley 2020; Peterson and Densley 2017; Pyrooz and Moule 2019), including a recent Eurogang edited volume titled *Gangs in the Era of Internet and Social Media* (Melde and Weerman 2020). Examining the content and language used by gang members on social media has taken a prominent role in these examinations. For example, an examination of the Twitter profile of one murdered Chicago gang member demonstrated that such communications are often used to promote gang affiliations, report on violent acts, and to facilitate networking between geographically diverse gangs (Patton et al. 2017b). Stuart (2020), drawing on ethnographic research in Chicago, argues that social media are used to openly challenge the strength and masculinity of rival gangs, an action that may engender violent retaliation in a certain subset of instances but not generally. Patton et al. (2019) highlighted the interactive way gangs use Twitter and find that certain types of messages (e.g., disses, call-outs, and threats) have a high potential to engineer a violent response. The mechanisms by which social media may or may not directly facilitate gang violence generally are not well specified nor measured. These limitations are drawn, in part, from a lack of clear, empirical data on individual-level social media usage by gangs that can be linked to changes in offline violence. However, the descriptive, critical examination of social media by and about gang members has given rise to theoretically driven linkages between online activity and "real world" violence.

Even if much of what gang members do online is the same as the activity of non-gang members (Moule et al. 2013, 2014), what makes gang members unique is their use of the internet to explicitly promote their criminal exploits and to insult and intimidate rivals (Johnson and Schell-Busey 2016; Pawelz and Elvers 2018). However, a recent study of gangs in London found there were "differential adaptations" to social media among gangs, including gangs that occupied the same geographic spaces (Whittaker et al. 2020). The authors attributed this to a "generation gap". They argued that newer gangs and younger gang members, especially those with tenuous "street capital" (Harding 2014), had more to gain and less to lose from signaling their reputations online versus more durable gangs and more senior gang members, who had street capital in the bank and could not afford the extra scrutiny that social media attention provided (see also, Densley 2020).

The nature of the online forum itself may also influence the nature of the discourse for gang members. Online disinhibition (anonymity) might mean youth act up more online than they would in person, magnifying the exacerbating tensions between gangs which can then later lead to violence in the streets (Patton et al. 2017b). Life online remains anchored in the lived experience (Lane 2018; Roks et al. 2020), which is why references to physical territories, such as street signs or zip codes (Densley 2013; Irwin-Rogers et al. 2018), are a fixture of "internet banging" (Patton et al. 2013). Leverso and Hsiao (2020) learned from digital trace data scraped from a public Facebook page about Chicago Latino gangs (resulting in over 140,000 posts, likes, comments, and comment replies) and combined with law enforcement data on the geographic locations of gangs, that fighting among gang members in the online environment was conditional on the type of post displayed, but also the geographic proximity of gang territory. They found gang members using social media

to interact with other gangs in faraway locales as well as individuals nearby, but the tone and tenor of that communication often reflected the degree of physical distance. Gangs living nearby, therefore, may have a much tighter (and rapid) relationship between online communication and what happens on the streets.

At the same time, the social distance that social media create can help diffuse tensions and de-escalate violence. In nature and many non-delinquent social engagements, one method of self-protection is presenting as more intimidating, larger, or more dangerous than is the case (Felson 2006; Howell 2007). Social media affords gangs the same illusion of size, strength, and spread (Densley 2013). For gang members living in Chicago's most dangerous neighborhoods, urban ethnographer Forrest Stuart (2020) found that exaggerated virtual identities created barriers to violence. By presenting themselves as scarier and more violent than they were in real life, including posting photographs of themselves posing in crowds of dangerous-looking people or holding borrowed guns, gang members could deter rival predation. Authenticity still mattered, however, and if rivals called someone on their bluff or caught them "lacking" (i.e., unwilling to take the bait), especially live on camera, then violent retaliation could follow. These findings hold important implications for law enforcement, who have been criticized (e.g., Lane et al. 2018; Patton et al. 2017a) for taking online claims at face value and unduly criminalizing actions that everyone on social media is guilty of—portraying their lives as more glamorous and exciting than they are, for the sake of retweets or likes. However, it should be noted that, given the nature of the ethnographic data and methods, the study findings cannot be broadly generalized and have not yet been validated by other studies by examining gangs outside of Chicago or with a larger sample of gangs.

4. Social Media and Focused Deterrence

There are a few reasons why social media could mediate, or even undermine, gang interventions such as focused deterrence. For example, focused deterrence requires "community moral voices" such as pastors and parents to reinforce or "retail" the law enforcement message that violence is wrong and will incur consequences (Densley and Jones 2016; Kennedy et al. 2001). However, in the age of social media, these voices cannot reach gang members with the same degree of constancy and invasiveness that social media feeds can, as they are delivered to phones and computers constantly. Additionally, both law enforcement and engaged community members are competing against persuasive digital design techniques such as push notifications and the endless scroll of a newsfeed, which capture the hearts and minds of users and create a feedback loop that keeps gang members (and non-gang members) attached their devices. Technology companies such as Facebook (which also owns Instagram), Google (which owns YouTube), and Twitter profit from keeping users on their platforms because more human engagement means more advertising dollars—their primary source of income in the absence of subscription and usage fees (Zuboff 2018). They facilitate and often encourage discourse with limited focus on the content to monetize their respective platforms.

Relatedly, social media platforms are designed to profit from "confirmation bias" (Nickerson 1998), the natural human tendency to seek, "like," and "share" (in social media parlance) new information that aligns with strongly held preexisting beliefs. To keep people online, they rely on adaptive algorithms that assess interests and flood users with content that is similar to what they have liked previously. This self-reinforcing cycle makes it difficult to change old habits such as violence and may bring together similar messages from competing gangs. Someone subject to focused deterrence may want to avoid gang content both in-person and online, but personalized media feeds based on past click behavior and search history instead create "filter bubbles" that make encountering aspects of active gang life unavoidable (Pariser 2011). The social media echo chamber can also provide near-constant reaffirmation for the gang by silencing outside voices and contradicting any intervention's countervailing messaging (Eckberg et al. 2018). Social media algorithms instead promote gang content that sparks outrage and which may

amplify biases. This need not be public or direct threats from rival gang members. Simply being reminded constantly of friends killed in action might be enough. For example, analyses of Twitter content have found that expressions of grief and loss predict increased future aggression among gang-involved youth (Patton et al. 2018).

The noise from public and direct threats posted on the internet may well "drown out" any focused deterrence messaging, especially those on social media that are perceived as immediate and localized threats of violence or insults to gang identity. Actively posting self-incriminating content that incites violence is so "costly" (Densley 2013) that it may well be an indirect measure of a gang or gang member's immunity to focused deterrence messaging; their willingness to be violent and contempt for the law (Sandberg and Ugelvik 2016). Law enforcement has, with increasing frequency, sought to leverage these public communications to prevent and prosecute criminal activity (Brayne 2017). At the same time, it is difficult for law enforcement and social service providers to proactively monitor the street for signs of impending violence when those high-risk individuals are not out in the street (Patton et al. 2016), and without input from "domain experts" (i.e., people fluent in gang content) such as ex-gang members, the cultural terms or coded language hidden in memes and emojis that may provoke violence could go undetected (Frey et al. 2020; Patton et al. 2019).

5. Materials and Methods

The Data

The data used in this study were derived from the administrative records and primary data employed in the primary evaluation of focused deterrence in Philadelphia (see Roman et al. 2019). These data describing general gang characteristics were constructed during a series of large audit meetings held during the evaluation period and led by members of the research team. In these retrospective, multi-agency meetings, law enforcement leadership, front-line officers, and task force members met to aggregate information about each of the gangs involved in the focused deterrence intervention. Information was provided by various individuals with first-hand knowledge about the gangs, discussed among all audit participants, and a consensus was reached (Roman et al. 2019). For each gang, the audit participants worked through the names of every possible member, adding and removing individuals as determined by group consensus. Prior studies have shown this to be a valid measure of determining the nature and extent of gang activity (see, e.g., Gravel and Tita 2015). The result of the audit was a holistic picture of the size, activity history, and activities of each gang (for a general discussion of this approach, see Sierra-Arévalo and Papachristos 2015, 2017).

The current study employs three types of variables, two of which are drawn from the gang audit procedures described above. The first type is *gang variables*, which focus on describing the size and general nature of the gang. While these data are, by nature, estimates, they represent the best available data on these gangs and their basic descriptive statistics and activity level. Importantly, the data on each of these gangs were developed by the same individuals and using the same procedures; though imprecision may be an issue, between-gang comparisons are supportable.

In this set of gang variables, the *number of rivals* indicates the count of other gangs the subject gang was actively feuding with at the time of the audit. *Heat level* is a measure of how violent and/or serious of a threat a gang was perceived to be by local law enforcement at the beginning of the initiative (in the second quarter of 2013) using a scale that ran from inactive to highly active. *Count of members* is the number of core participants derived from the audit; *gang associates* provide the same information, but for individuals less central to the core activities and/or direction of the gang. Finally, *average age* reports the average age of known members of the gang (not associates) based on administrative records (i.e., arrest and court records).

The second set of gang variables are the *social media variables*, developed from a different source, though using a largely similar process. A series of audits focusing only on

social media usage was held with the intelligence unit officers assigned to the gang task force in the focused deterrence target area. In this role, these officers were responsible for the collection, oversight, and synthesis of information on social media activity by the gangs in their assigned region who were under investigation and/or surveillance. As with the larger audits, data were obtained independently from each officer and then cross-validated. This audit was conducted in early 2018 as interim impact analysis indicated that not all gangs were responding to the focused deterrence messaging. At this time, the evaluation window had concluded, but data collection for the study was still active. The variables focused on estimates for and descriptions of specific online activities (e.g., feuds, threats to law enforcement, and displays of violence and illegal items such as guns and drugs), overall usage of various social media sites, estimates of how active social media usage was within the gang, percent of high-visibility gang members using social media, and estimates of the prevalence of violent content by gang members across all platforms.

In these data, the *percent active on social media* variable captures the percent of all known gang members believed to use social media for gang-centric activities. *Percent impact* indicates the number of high "impact" individuals from the gang, often leaders and senior members, who were known to use social media for gang-related activities. The *overall social media usage* variable captures the total amount of social media usage attributable to the gang as compared to other gangs in the city. *Illegal content* (e.g., images or discussion of guns, cash, and/or narcotics) and *violent content* convey similar information about these subtypes of postings by the gang. Due to the difficulty in ascertaining precise levels of social media activity, these data are captured in measures using categorical values (ranging from no activity to high levels of activity of that type) with overall levels of gang activity in the city at the time used as a reference. Similarly, variables regarding threats to law enforcement, rival gangs, and other activity are constructed as binary variables reflecting the presence or absence of the subtype of online activity during the focused deterrence evaluation period. Finally, *percent violent content* is an estimate of what percentage of all content posted by the gang and gang-involved individuals were estimated to be explicitly violent (e.g., direct threats, boasts of past violence) in nature.

Finally, the *gang shootings* variable is the average quarterly change in gang-involved shootings, comparing the period before the gang was first called in to a notification meeting to the period after the gang's first call-in meeting. The values for this variable were derived from the regression models in the main impact analyses (Roman et al. 2019). For these analyses, a gang-involved shooting is a shooting in which the PPD identified the perpetrator as a member of a targeted gang. The research team had collected data on every shooting in the target area between January 2009 and 1 April 2015. If there were any shootings where the research team did not have coded shooting data from the PPD, the intelligence analysts re-reviewed the spreadsheet to validate the data entry.

The auditing process employed for this study and related work (see Roman et al. 2019) was designed to quantify the often-subjective perceptions of law enforcement actors regarding various aspects of gang activity in Philadelphia in a consistent manner. Modeled off previous successfully implemented audits (see e.g., Kennedy et al. 1996; Papachristos and Kirk 2015), the auditing process included multiple efforts to cross-validate the data collected between several stakeholder groups and actors, both between gangs and over time, to develop the most robust measures possible. This is important as the construction of gang databases is an exercise fraught with challenges, especially in operationalizing definitions of activity and membership (Densley and Pyrooz 2020; Kennedy 2009). In particular, questions about the accuracy (e.g., are audit assessments reflective of the "real" world?), reliability (e.g., are audit assessments consistent over time and repeated measurements?), and validity (e.g., are audit assessments focusing on the correct measures of activity?) persist. While difficult to authoritatively answer, the audit data, derived using the processes above, represent the best and, in some cases, only data on gang-level activity available to both the research team and local law enforcement. The audit process also includes several procedural checks, including verification of all assessments using multiple types of data

and/or more than one reporting source, to limit the potential influences of individual- or system-level biases. While potentially imperfect, social network analyses have shown that, beyond the focused deterrence model, data derived from audits can successfully guide interventional efforts in policing (Sierra-Arévalo and Papachristos 2015) and violence reduction (Tita and Radil 2011).

6. Results

To examine the associations between social media and gang violence, we first consider the descriptive statistics for the variables developed during the social media audits. These data present a unique picture of the perceived online activities of the subset of gangs that were included in the evaluation. Subsequently, we seek to examine the associations between the factors detailed above and changes in the observed rates of violence. We do so by calculating partial correlations between the shooting outcome for all fourteen gangs, the average quarterly change in shootings over time, and the social media variables. In these comparisons, we control for the gang variables to better identify the focal relationships.

We first consider the variables relating to gang characteristics and compare means, ranges, and standard deviations for two aggregate groups. Table 1, below, reports average values for the group of gangs that demonstrated an increase in shootings (n = 3) during focused deterrence as compared to those reporting a decrease (n = 9). Note that, for this set of analyses only, we omit the single gang for which no change in shooting rates was reported as this outcome is not appropriately attributable to either the "increase" or "decrease" groups and including a single gang as a distinct category could result in that gang becoming identifiable.

Table 1. Gang-level descriptive statistics, by change in shootings.

Gangs That Increased Shootings during Focused Deterrence (*n* = 3)						Gangs That Decreased Shootings during Focused Deterrence (*n* = 9)					
	N	Min	Max	Mean	Std. Deviation		N	Min	Max	Mean	Std. Deviation
Number of known and active rival gangs	3	3	5	4.00	1.00	Number of known and active rival gangs	9	2	5	3.22	1.20
"Heat Level", as assessed by law enforcement	3	3	3	3.00	0.00	"Heat Level", as assessed by law enforcement	9	2	3	2.89	0.33
Number of known gang members	3	22	123	69.33	50.79	Number of gang members	9	7	122	49.56	37.70
Number of known associates to the gang	3	5	34	15.67	15.94	Number of known associates to the gang	9	0	33	12.00	12.15
Average age of gang members	3	23	25	24.000	1.00	Average age of gang members	9	23	32	25.889	3.29
Average number of times called in during FD	3	2	4	2.667	1.15	Average number of times called in during FD	8	3	4	3.875	0.3

NOTE: FD = focused deterrence.

There are slight observable differences between the gangs that responded positively (n = 10, average change in shooting incidents per quarter: −0.51) to focused deterrence and those that did not (n = 3, average change in shooting incidents per quarter +0.72) (see Figure 1 above). On average, the gangs with more shootings during the implementation of the strategy than before focused deterrence had more rivals with whom they were actively feuding (4.0 v. 3.22 known rival gangs) and, not surprisingly, had been deemed "hotter" about their observed levels of criminal activity (3.0 v. 2.89) at the start of the strategy (e.g., 2013). They were also slightly larger, on average (85 total individuals v. 61.56 total individuals), though the ratio of the more engaged member to affiliated associates (81.5% v. 80.5%) is only slightly larger than that of the gangs whose violence decreased. Finally, though most gang members were young, the more violent gangs had members who were

1.89 years younger than their peers in the less violent gangs, on average. Taken together, these data suggest that there are some differences between the overall characteristics for the gangs who maintained or increased their shootings post-implementation of focused deterrence versus those that had fewer shootings. This is particularly true concerning their size, but, overall, this variation is not overwhelmingly large, nor were any significant outliers identified. This is unsurprising because the gangs that were included in the intervention were all located in the same area of the city and met the common criteria for inclusion in focused deterrence.

We next turn our attention away from the streets and towards the virtual world. Detailed in Table 2 below, these data describe average levels and the nature of social media activity attributable to the gangs, again disaggregated by their response to the intervention.

Table 2. Gang-level social media descriptive statistics by change in shootings.

	Gangs That Increased Shootings during Focused Deterrence (*n* = 3)					Gangs That Decreased Shootings during Focused Deterrence (*n* = 9)				
	N	Min	Max	Mean	Std. Deviation	N	Min	Max	Mean	Std. Deviation
Number of known and active rival gangs	3	3	5	4.00	1.00	9	2	5	3.22	1.20
"Heat Level", as assessed by law enforcement	3	3	3	3.00	0.00	9	2	3	2.89	0.3
Number of known gang members	3	22	123	69.33	50.79	9	7	122	49.56	37.70
Number of known associates to the gang	3	5	34	15.67	15.94	9	0	33	12.00	12.15
Average age of gang members	3	23	25	24.000	1.00	9	23	32	25.88	3.29
Average number of times called in during FD	3	2	4	2.667	1.15	8	3	4	3.87	0.35

NOTE: FD = focused deterrence.

As was the case with the gang-level descriptive statistics, a visual examination of Table 2 shows that there were small differences between the two groups' online activities. The gangs that did not respond to the intervention, for example, were overall more active on social media (85% v. 68.8%), and a higher proportion of high visibility impact members were engaged in these online activities (93.3% v. 78.33%). Unsurprisingly, this also translated to a higher aggregate score of social media usage (2.67 out of 3 v. 2.11), as well as the scores for violent (2.0 out of 3.0 v. 1.67) and general illegal (2.67 out of 3.0 v. 1.89) postings. Finally, small differences (3.3%) in the number of overall messages that were violent can also be observed. The differences in this area appear to be the most pronounced concerning the pervasiveness of use among high-impact leaders and the general membership, though the gangs that did not desist have higher average levels of violent and illegal rhetoric.

Finally, we calculated a series of partial correlations between our proxy for violence during the evaluation period, the average change in the rate of shootings post engagement, and the various social media variables described above. Data from all fourteen gangs who were enrolled in the evaluation are used in this analysis. In calculating these statistics, we control for the gang-level variables (heat level, number of reported rival gangs, average age, size (members and associates), and the number of individuals on probation in the gang. We also control for the number of times the gangs were "called-in" during the evaluation period. As reported in Table 3 below, these associations provide some insight into both the direction and potential strength of the relationship between virtual behaviors and violence on the streets.

Table 3. Partial correlations between social media activity and shootings, after implementation of focused deterrence (n = 14).

		Social Media Variables								
		% Active	% Impact	Overall Social Media	Illicit Social Media	Viol. Social Media	% Violent Posts	Feud Online	Threat: Rivals	Threat: Law Enforce	Other Activity
Average change per quarter in counts of gang-related shootings	Correlation Coef.	0.67	0.90	0.89	0.97	1.00	−0.45	0.35	0.39	0.51	0.63
	Significance (2-tailed)	0.33	0.10 **	0.10 **	0.03 *	0.00 *	0.55	0.65	0.61	0.49	0.37
	df	2	2	2	2	2	2	2	2	2	2

NOTE: * $p \geq 0.05$; ** $p \geq 0.1$.

An examination of the correlation coefficients highlights a range of associations between social media usages among the fourteen gangs and the number of shootings in which they were involved after becoming involved in the evaluation. The coefficient reported here is one that must fall between −1 and +1, with larger positive numbers indicating a stronger positive relationship, negative numbers indicating a stronger negative relationship, and 0 indicating no relationship is described by the data in the sample. It is illustrative to consider these variables in two subgroups: first, measures of how active the gang was online and, secondly, descriptions of the kinds of content that the gang posted online.

Overall, some of the variables that were associated with an increase in shootings after the implementation of focused deterrence were those that described the general presence of the gang on social media. For example, the overall percentage of "impact" players, generally leaders and highly visible members, was significantly associated with higher shooting rates (r = 0.89, $p \geq 0.1$). The same is true about the overall level of social media usage attributable to the gang (r = 0.88, $p \geq 0.1$). While failing to reach statistical significance, the overall percent of known gang members who were active on social media demonstrated a similar pattern in the direction of the correlational relationship (r = 0.67, ns) with more gangs with more identified shootings during focused deterrence.

A consideration of the type of content that the gang was seen as having posted to social media paints a more complicated picture of the relationship between the internet and the street. Three of the variables categorically describe the nature of the gang's general activity on social media. Illicit postings, those that reference illegal activities but are not directly violent (e.g., post picturing or discussing guns, drugs, or ill-gotten cash), are significantly and strongly associated with higher shooting rates (r = 0.97, $p \geq 0.05$). A similarly constructed variable capturing perceptions of overly violent content (e.g., threats and warnings) also reached statistical significance rates in this analysis (r = 0.99, $p \geq 0.05$). Similarly, the variable capturing the overall level of social media engagement attributed to the gang was significant and positive (r = 0.88, $p \geq 0.1$). However, the variables that capture specific kinds of social media activity discussed as likely to spill over into the streets had a different relationship with shootings in this analysis. Estimates of the percentage of the number of a gang's violent postings were negatively associated with shooting (r = −0.45, ns), a surprising result. Other measures assessing specific kinds of social media activity were also correlated with a positive change in the number of shootings after their experience with focused deterrence began, though none reached statistical significance: engagement in online feuds (*r* = 0.35), threats to rival gangs (*r* = 0.39), posting of other, illicit types (*r* = 0.62). Finally, the correlation with our measure of the extent to which the gang threatened law enforcement officers online was also positive, though not statistically significant (*r* = 0.51).

7. Discussion

Violence, especially shootings, can be pervasive and deeply engrained into gang-related actions (Decker 1996). This has presented a persistent challenge for both law enforcement and public policymakers (see, e.g., Papachristos 2011). Focused deterrence is one shooting reduction intervention that has been both widely adopted and enjoys a fairly robust and supportive foundation within the evaluation literature (see Kennedy et al. 1996; Kennedy 2019; Braga and Weisburd 2012; Braga et al. 2018). Social media, over the past ten years, have taken on a central role in how many gangs develop and express their identity (Storrod and Densley 2017), and it has been argued that they may contribute to subsequent violence (Patton et al. 2019). Despite these parallel and contemporaneous trends, few studies have sought to analytically examine the impact of social media usage by gangs within the framework of a violence reduction intervention. There are many reasons for this, including challenges in obtaining the relevant empirical data and rapid changes in social media usage and platforms (Irwin-Rogers et al. 2018). The results of the current study, which makes these preliminary connections, can inform our theoretical understanding of the nexus between online activity and street violence, as well as provide evidence of new avenues of emphasis for focused deterrence.

The descriptive statistics on gang-level social media usage paint a picture that is largely consistent with the profile that was developed within ethnographic and qualitative studies in this area. As multiple scholars have noted, gang communications made online can be both expressive (e.g., Stuart 2020) and utilitarian (e.g., Johnson and Schell-Busey 2016). Threats of violence that do not translate to action may be considered the former, while discussion of criminal activity may be the latter; we find evidence of both. These data also show that, on average, the gangs in this study promoted violence in almost one-third of their postings; all gangs had a group-level online presence, and not a single gang was scored as not using that platform to engage in activity online related to illegal activities.

These descriptive results reinforce the argument that social media may play a dominant role in general communication for gangs in the current moment. For the gangs in this study, even a cursory examination of the descriptive data shows that not all social media postings are equal, with some being used for expressive and arguably non-violence purposes. For example, the percent of violent postings ranged from 15% to 60% across all gangs in the sample. This range was largely the same within the gangs who were grouped based on this response to focused deterrence, suggesting that while usage itself is pervasive, gangs employ social media to deliver a wide range of rhetoric. The support of characteristics of communication common in the current literature strengthens the robustness of the assumptions that underlie them as the current study relies on a different methodological approach and investigates gangs in a previously unexamined jurisdiction.

A comparison of those gangs that had an increased rate of shootings with those that had a decreased rate of shootings during focused deterrence shows some differentials of note. We find, as others have (e.g., Harding 2014), that the gangs that increased their shootings are younger by about two years on average. They are also slightly larger in terms of the number of members. This difference is compounded by the fact that a higher percentage of the gang, both overall and of the "impact" members, are engaging in these forums. This, in turn, translates to a higher overall social media usage score and, in all likelihood, a larger and more visible footprint for the gang on the internet. This reinforces the commonly made assertion that gang intervention strategies have evolved to integrate social media as an important venue for communication (Bock 2012; Densley 2020; Pyrooz and Moule 2019).

Our results paint a more complex picture about the correlates between online activity and shootings among all of the gangs in this sample. On one hand, we find some differentiation based on the types of social media content. Directly threatening rivals, as well as being willing to openly challenge law enforcement, which can easily be assumed to translate to the kinds of in-person confrontations that may lead to violence, did not correlate with our outcome. The same was found concerning the development of online

feuds; online feuds did not appear to be associated with shootings on the street. Unlike some of the results of recent examinations (Patton et al. 2019), we find that it is not the explicitly violent rhetoric directed at identifiable parties that correlated with shootings. Instead, the significant associations were linked to the overall tenor and tone of the gang's presence on social media. Here, for example, the overall measures of violent and illegal content that were believed to characterize the online presence of the gang were found to be significant.

It may be the case that threats on social media activity are more easily dismissed as puffery and posturing (Densley 2013; Felson 2006) and not such a viable threat that rivals feel compelled to respond in the immediate. Alternatively, this may be because violent rhetoric may be rejected as more performative than similar activities by gangs, especially in the more anonymous and less inhibited online space (Stuart 2020; but see Patton et al. 2017b). A more concrete and ongoing discussion of illegal activity, which here includes the display of cash and weapons without threats, could have been seen as a more definitive indicator of viable criminality and less as online chatter. These types of activities may be seen as openly and genuinely contemptuous of law enforcement as well (Sandberg and Ugelvik 2016). When backed up with pictures, posts openly displaying illegality may simply reflect more criminally active gangs (and so they are more likely to find its members in an encounter or scenario that develops into a shooting), given the clear ties between online conduct and lived experience (e.g., Roks et al. 2020). This may be especially true when the more overly violent commentary comes from gangs that are younger (though the differences here are small and could be practically insignificant). Future studies should explore these preliminarily identified relationships more deeply, and, where possible, within a causal framework.

The results of this study also provide support for some of the currently hypothesized theoretical frameworks that may link online activity by gang members to violence on the streets, especially shootings. From a Differential Association perspective, firstly, social media might function to increase the frequency, duration, and intensity of face-to-face gang communications (McCuddy and Esbensen 2020). It may also increase exposure to unique or online-only gang associations, thus introducing members to individuals with different constructions of definitions favorable toward crime, the acceptability of violence, and the necessity of having firearms. At the very least, social media create the illusion of proximity, connectivity, and having a large audience, both locally and internationally, that far exceeds the opportunities available using offline communications. In the current data, we see this reflected in the extent of overall usage of social media, as well as the number of "impact" players who are present in these online forums. The usage of social media is nearly universal among the gangs in this sample, suggesting that their audience and influences may be both evolving in a difficult-to-predict direction.

When considering these results from a Routine Activities perspective, we also find evidence for a relationship between online activity and violence. In this study that the presence of gang members on social media is hardly benign: threats, overt criminal activity, and other illegal behaviors are reported as being commonplace in this sample. Generally, gang members report high rates of offending and victimization in online settings, including harassment, intimidation, and violent threats (Pyrooz et al. 2015), an outcome supported by these gang-level activity data. Given the extent of usage, in the social media age, it is likely that individuals in these gangs are tasked with creating a continuous stream of gang-related content for consumption as one of their duties of gang membership (Storrod and Densley 2017). On the one hand, this might incapacitate gang members for a short period by keeping them focused on their screens instead of on the street. However, as Lauger and Densley (2018) observed in their content analysis of YouTube rap videos produced by gangs in upstate New York, the internet is a natural extension of the street in part because it meets the symbolic needs of gang members as a status enhancer. Short-term benefits may be lost as the give-and-take between social media and the street becomes a basic function of gang life. The fact that gang reputations can now be quantified by the number

of followers, likes, and retweets creates incentives to "do gang" (Lauger and Densley 2018) and "perform" gang membership for status or to save face (Van Hellemont 2012). This raises the prospect that gang members are "taken in by their own act" and find themselves unable to break character on the street, no matter the invasiveness of, or potentially benefits inherent in, engaging in a violence-reduction intervention (Goffman 1959). The impact on street shootings for the gangs more deeply engrained in this way of thinking is possibly reflected in the correlations observed here.

Lauger et al. (2020), using General Strain Theory as their guide, argue that threatening or insulting online material becomes a tension that is more likely to incite violence when it is seen as unjust, high in magnitude, is associated with low social control, and creates pressure or incentives for criminal coping. For example, in *The Digital Street*, Lane (2018) argues that social media has not only blurred the boundaries between the physical and virtual worlds but has extended Anderson (1999) "code of the street" online (see also, Urbanik and Haggerty 2018). Here, the correlations, albeit limited, between some measures of social media usage and shootings support the robustness of this relationship. This relationship goes in both directions; previous survey research has shown that gang members who are more invested in the code of the street are also more likely to respond violently to online threats, (Moule et al. 2017). In another study, gang-involved youth interpreted "dissing" (content that humiliates and degrades), "calling out" (content that challenges or questions someone's reputation or social status), and "direct threats" as the most threatening forms of communication on Twitter (Patton et al. 2019). In this case, the gangs with higher degrees of "impact" players engaging online, perhaps a proxy for gang-level investment, was one of the stronger correlates with an increased number of shootings during focused deterrence. The resulting actions by gang members, unlike the messages themselves, may spill out onto the streets as shootings as the result of these increased digital tensions

Finally, and perhaps most usefully, these results provide a foundation for a reconsideration of how focused deterrence specifically, and gang violence reduction policy more generally, can take these issues into account. In many ways, the keystone of focused deterrence is the messaging about the consequences to gang members if any member commits a shooting (as well as the benefits of abstaining, including the services that are typically made available). Practically, when certain members of the gang are "called in" to hear these propositions from law enforcement and community leaders, it is assumed that they will transmit the message to others in their gang and that this message will be heard. Here, given the correlations found, the near-constant drone of social media chatter may be "drowning out" that message for certain gangs.

The extent to which a gang actively engages with social media may, in itself, be a useful proxy for the extent to which gangs are willing to disregard or are unable to internalize the messaging in focused deterrence. Given the way law enforcement has responded to internet activity, actively posting illegal content, especially postings designed to flaunt criminal behaviors or taunt rivals, is risky (Densley 2013). Therefore, this could serve as a signal that a gang's desire to be seen as violent or a threat to rivals may supersede the more practical, but distant, consequences communicated out in the focused deterrence messaging. (Sandberg and Ugelvik 2016). Practically, during focused deterrence public social media activity could be captured in near-real-time and examined at the gang, not the individual level. In this way, these data may provide data-driven feedback on how certain gangs are responding to the intervention. This may inform which gangs are "called in" for meetings under the focused deterrence guidelines in that jurisdiction.

Within an existing researcher-practitioner partnership, social media analysis can provide a useful opportunity to tailor a program or intervention to the realities of the street (Sierra-Arévalo and Papachristos 2017). The formative feedback and hypothesis development process, facilitated by independent researchers, can help better identify areas of the strategy (e.g., messaging, forums, community partners engaged) that might not be working, or that need differential focus to be more effective in reaching the unresponsive target gangs. In Philadelphia, for example, there was a strong emphasis on fidelity to the

focused deterrence model, which had been collaboratively developed at the outset of the project period. While an important aspect when replicating a national model, this may have supported a focus on responding fully to each potential opportunity for a crackdown, leading to missed opportunities to flexibly adapt to the shifting realities on the street. Building in a process for the analysis and discussion of social media data may formalize such an opportunity in future iterations of focused deterrence.

Finally, the results of this descriptive analysis should bring these issues to the forefront for the justice system and community stakeholders seeking to understand how gangs communicate and whether and how aspects of social media use have a street component. Here, the types of social media posting that are most likely to be considered an immediate threat, including threats of violence, did not correlate with an increase in shootings during focused deterrence. Instead, it was a broader pattern of online engagement that best reflected an increased risk. The findings here should be interpreted with the proper caveats. There may be measurement errors or other unknown biases in the variables as constructed. For example, the variable constructed as *a percentage of the number of a gang's postings that were violent* is dependent on the assumption that the social media information collected by law enforcement appropriately represents the extent of a gang's social postings. Regardless, the study results underscore the potential value of holistically examining the holistic picture of a gang's internet activity as well as individual posts when seeking to understand how a particular gang may act in the future. These results do not, however, support the examination of social media usage at the individual level, as there are myriad methodological and ethical issues inherent in that approach. While there is a significant amount of research and policy development necessary to develop, examine, and evaluate the nature of these relationships, the current findings provide an impetus and justification for expanding the scope of this critical work.

8. Limitations

In addition to the limitation mentioned directly above on measurement error, there are additional limitations inherent in the data available and the methods used in the current analysis. First, it should be noted that this study includes only a small number of gangs overall, and the implementation of focused deterrence in Philadelphia was unique (see Roman et al. 2019, 2020). Additionally, the gangs studied were from one section of Philadelphia that may have unique norms and culture. This constrains the generalizability of the findings, both within the local context and to other cities. Secondly, and related to measurement error, the data that were gathered during both auditing processes are the best and, in some cases, the only data of this nature, but they have limitations. Audit data are inherently retrospective, represent the perspective of a small number of law enforcement officers and/or agency staff, are unverified outside of the auditing process (and could be unverifiable using administrative data), and do not include the perspectives of the justice-involved members that are described by these data. Additionally, the intrinsic uncertainty regarding actual internet usage and behaviors meant that much of the social media data were reduced to being estimated as categorical variables or using broad scales; this limits the precision of the data and results. Finally, the methods employed here provide only descriptive statistics or describe only correlations with shootings; these results are not causal and should not be interpreted as such. Even with these limitations, the outcome of this study sheds empirical light on a debated, but rarely measured, aspect of life for gang-involved individuals and provides an opportunity to reconsider the results of an effort to reduce shootings in Philadelphia.

9. Conclusions

Focused deterrence is a widely used intervention to reduce gang-related shootings. When implemented in Philadelphia, a quasi-experimental evaluation found a reduction in shootings across the community that comprised 14 targeted gangs. However, when examining the change in shootings by gangs, it becomes clear that not all gangs responded

equivalently, with some demonstrating an increasing rate of known shootings during the assessment. Here, we find descriptive evidence that there are differences between those gangs that responded well (i.e., a decrease in gang shootings) and those that did not regarding the nature and content of social media activity. When looking at all the participating gangs, we find that their overall level of engagement with social media, especially by high visibility gang members, was significantly correlated with a higher level of shootings during the implementation of focused deterrence. The variables that measured the posting of specific kinds of violent content, on the other hand, did not reach significance. These findings provide preliminary evidence on the potentially mediating role that public, social media content may have on efforts to reduce gang shootings. While more robust and causal evidence is needed to further specify these relationships, the role of social media should not be ignored when developing harm-prevention interventions, including focused deterrence, for this population of gang-involved individuals.

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Street Gang Intervention: Review and Good Lives Extension

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Abstract: Tackling street gangs has recently been highlighted as a priority for public health. In this paper, the four components of a public health approach were reviewed: (1) surveillance, (2) identifying risk and protective factors, (3) developing and evaluating interventions at primary prevention, secondary prevention, and tertiary intervention stages, and (4) implementation of evidence-based programs. Findings regarding the effectiveness of prevention and intervention programs for street gang members were mixed, with unclear goals/objectives, limited theoretical foundation, and a lack of consistency in program implementation impeding effectiveness at reducing street gang involvement. This paper proposes that the Good Lives Model (GLM), a strengths-based framework for offender rehabilitation, provides an innovative approach to street gang intervention. Utilizing approach-goals, the GLM assumes that improving an individual's internal skills and external opportunities will reduce the need to become involved in street gangs. Wrapping the GLM framework around current evidence-based interventions (e.g., Functional Family Therapy) increases client engagement and motivation to change, which is notably poor amongst those at risk of, or involved in, street gangs.

Keywords: street gangs; public health; Good Lives Model; intervention; prevention

1. Introduction

Street gangs are a growing problem internationally, with countries including the UK, USA, Sweden, China, and the Netherlands reporting a marked increase in street gang membership (e.g., Chui and Khiatani 2018; Roks and Densley 2020; Rostami 2017). In the UK alone, the number of street gang affiliated youths has seen a dramatic increase over a five-year period. The Children's Commissioner (2017) approximated that in 2013/14, 46,000 young people were either directly gang-involved or knew a street gang member. By 2019 this figure had increased to 27,000 full street gang members, 60,000 affiliates, and a further 313,000 youths who knew a street gang member (Children's Commissioner 2019). Similar increases have been seen in the USA, with a 40.83% growth in the number of different street gangs between 2002 and 2012 (National Gang Center 2020). As such, the World Health Organization (World Health Organization 2020) has highlighted youth violence, including street gang membership, as a global public health problem that requires an immediate international response.

Street gang membership is associated with increased perpetration of illegal activities, particularly serious and violent offences (Pyrooz et al. 2016), with this relationship stable across time, place, and definitions of street gangs (Dong and Krohn 2016). As such, street gangs are responsible for causing heightened levels of fear and victimization amongst members of their community (Howell 2007). In addition, street gang involvement has adverse health, welfare, and economic consequences for individual members, which persist long after disengagement (Connolly and Jackson 2019; Petering 2016). For instance, longitudinal research identified that adults who belonged to a street gang during adolescence experienced more mental and physical health issues than their non-gang

counterparts (Gilman et al. 2014). Adolescent street gang members also experience more economic hardship during adulthood than their non-gang peers, with higher rates of unemployment and reliance on welfare benefits or illicit income (Krohn et al. 2011). Furthermore, street gang involvement during adolescence has a detrimental effect on the development of long-term stable family relationships, with former members more likely to engage in intimate partner violence and child maltreatment (Augustyn et al. 2014).

Considering these long-term and wide-ranging effects of street gang membership, it is unsurprising that there has been a proliferation of prevention and intervention programs developed and implemented world-wide. Although literature is beginning to emerge which suggests some of these are effective programs at reducing street gang involvement, there remains a paucity of reliable evidence to date. Highlighted by Wong et al. (2011). such programs often suffer from a lack of theoretical foundation (McGloin and Decker 2010), clear goals and objectives (Klein and Maxson 2006), and methodologically sound evaluation (Curry 2010). These factors are associated with an increased risk of harmful outcomes for program participants (Welsh and Rocque 2014), including negative labeling and heightened rates of recidivism (Petrosino et al. 2010). Thus, discovering "what works" in street gang prevention and intervention is essential.

A public health approach to street gang membership has recently been suggested (Gebo 2016), which could guide the development of effective prevention and intervention strategies. WHO (Krug et al. 2002) suggests four key elements for a public health approach, including: (1) surveillance, (2) identifying risk and protective factors, (3) developing and evaluating interventions, and (4) implementation. See Figure 1 for an overview of each of these elements in relation to street gang prevention and intervention. Using a public health approach, street gang intervention occurs across three levels (Conaglen and Gallimore 2014): primary prevention (early intervention approaches prior to initiation of street gang involvement), secondary prevention (interventions specifically for individuals at-risk of street gang involvement), and tertiary prevention (long-term rehabilitation strategies for those who have engaged in street gangs). In addition, public health interventions can be universally implemented (aimed at the general population), selected (targeted towards those at-risk of street gang involvement), or indicated (targeted specifically at street gang members).
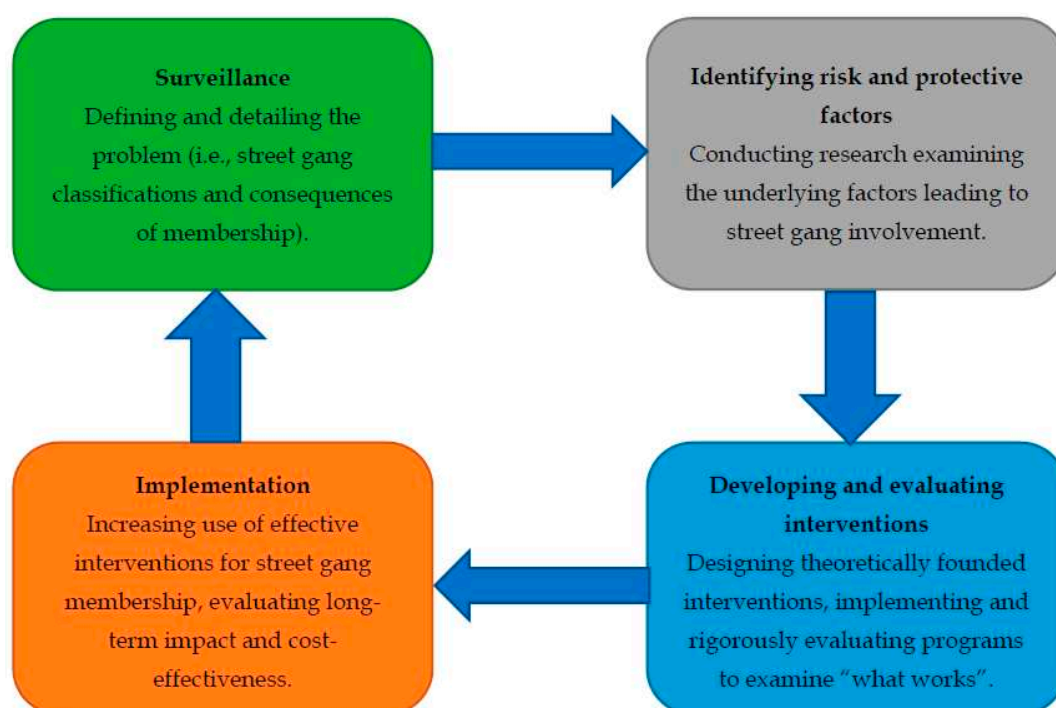
Figure 1. WHO's public health approach to violence prevention (Krug et al. 2002), adapted for street gang intervention.

Public health approaches have seen a number of successes in reducing behaviors related to street gang membership (e.g., substance misuse, child maltreatment and youth violence; HM Government 2019; Pickering and Sanders 2015; Public Health England 2015). However, research is limited regarding the effectiveness of interventions for street gang members (McDaniel et al. 2014). The aim of this paper is to narratively summarize and evaluate existing street gang prevention and intervention programs, within a public health approach. Aspects of the public health approach will be outlined in relation to street gang membership, including: (1) surveillance (i.e., street gang definitions), (2) risk and protective factors, (3) current street gang prevention and intervention programs (including primary, secondary, and tertiary interventions). Furthermore, this paper will examine how a novel approach to offender rehabilitation, termed the Good Lives Model (Ward and Fortune 2013), could be used as a framework to guide street gang intervention.

2. Surveillance

Surveillance is a core aspect of a public health approach, which informs the development and implementation of prevention and intervention programs (Richards et al. 2017). Surveillance involves establishing clear definitions regarding the population of interest (i.e., street gang members), enabling the identification of both those in need of intervention and the associated risk factors (Department of Health 2012). By implementing surveillance measures, such as analyzing knife crime and criminal convictions data, the extent of the problem in society on a local, national, and international scale can be recognized (World Health Organization 2010). Ongoing monitoring enables any changes in the patterns or frequencies of behavior to be quickly identified and disseminated to intervention providers, informing the decision-making process (Public Health England 2017).

Street Gang Definition

The definition of a street gang member has been a matter of ongoing debate amongst academics, policy-makers, and stakeholders for decades (e.g., Esbensen and Maxson 2012). To date, no single, standardized definition of a street gang has been agreed. The ambiguity surrounding the definition of a street gang has serious consequences for the development of effective prevention and intervention strategies. As Melde (2016, p. 160) explains, "you cannot manage what you cannot measure". Without a reliable and valid definition, stakeholders are unable to accurately measure the rates of street gang members and street gang-related offending. In addition, a lack of clear definitional criteria prevents an assessment of the short- and long-term impact of prevention and intervention strategies on street gang dynamics (Melde 2016).

To overcome this, stakeholders often devise their own street gang definition, which allows them to undertake surveillance procedures and see the impact that prevention and intervention strategies have on the local area. However, definitions of a street gang often vary widely from one region to the next (Gilbertson and Malinksi 2005). For instance, each jurisdiction in the USA has its own definition of a street gang and what constitutes a street gang-related offence (for a summary of definitions, see National Gang Center 2016). Despite attempting to measure the same phenomenon, by using different definitions a large disparity is likely to emerge in the estimates of street gang members and rates of street gang-related offending between areas. Dependent on the definition used, an over-identification (incorrectly identifying an issue as related to street gang membership, when it is not) or under-identification (incorrectly identifying an issue as unrelated to street gangs, when it is) of street gang members and street gang-related offending can occur (Joseph and Gunter 2011). As such, prevention and intervention strategies for street gang members may be offered to too few or too many in the local area. Furthermore, the differences in definitions used mean the generalizability of any prevention and intervention strategies across areas is limited.

One method of identifying street gang members is through self-nomination, whereby stakeholders simply ask individuals "are you currently in a gang?" (Esbensen et al. 2011). Past research has found self-nomination to be a valid and effective method of identifying street gang members (e.g., Decker et al.

2014; Esbensen et al. 2001; Matsuda et al. 2012). In addition, self-nomination of street gang membership is associated with heightened levels of violent crime (Melde et al. 2016), which is consistent with the extensive research suggesting street gang members are more likely to commit serious and violent offences than their non-gang counterparts (Melde and Esbensen 2013). However, self-nomination relies on the individuals' willingness to respond honestly, which could be reduced due to the negative impact of disclosing street gang membership (e.g., risk of incarceration or retaliation from street gang peers). Critically, self-nomination is dependent upon an individual's subjective understanding and interpretation of the term 'gang' (Tonks and Stephenson 2018). As public health surveillance requires street gang members to be identified by an objective party, self-nomination methods would not be appropriate.

The Eurogang Network, a group of the world's leading street gang researchers, attempted to establish a standardized definition of a street gang, which would allow cross-national comparative research and surveillance (Klein and Maxson 2006). According to the Eurogang definition, a street gang is a "durable, street-oriented youth group whose involvement in illegal activity is part of their group identity" (Weerman et al. 2009, p. 20). Specifically, the group must: (1) include more than three people, (2) last longer than three months, (3) be street-orientated, (4) be acceptive of illegal activities, and (5) engage in illegal activities together (Matsuda et al. 2012). Critically, the Eurogang definition does not require an individual to self-nominate in order to be classed as a street gang member. The Eurogang Network avoids using the term 'gang' due to its emotive nature, instead preferring "troublesome youth group" (Esbensen and Weerman 2005).

Although the Eurogang definition is increasingly adhered to in academic research, policy-makers and stakeholders are resistant to its use. For instance, stakeholders have suggested that avoidance of the term 'gang' reduces their ability to effectively distinguish between a street gang and a group of individuals who happen to commit offences together (Centre for Social Justice 2009; Pearce and Pitts 2011). Supporting this, researchers have found that the Eurogang definition leads to an over-categorization of groups as street gangs (e.g., illegal ravers, peer groups who consume drugs; Medina et al. 2013). Aldridge et al. (2012) suggests this is due to a lack of defining criteria concerning street gang members engagement in violent crime. Despite typically being used in academia as a self-report measure, the Eurogang criteria are observable (i.e., stakeholders can see whether a young person is in a large street-based group, committing crimes), enabling surveillance measures for identifying and monitoring street gangs (Melde 2016). To support consistency across surveillance measures and intervention provision, it is recommended that the Eurogang definition is used to guide a public health approach to street gangs.

3. Risk and Protective Factors

A public health approach involves developing an understanding of the causes of street gang membership (Local Government Association 2018). This takes two forms, with the identification of risk factors (increasing the likelihood of street gang involvement) and protective factors (reducing the likelihood of street gang involvement). By establishing a framework of risk and protective factors, this informs the development of prevention and intervention strategies aimed at reducing involvement in street gangs. To date, focus has been placed on identifying the risk factors for street gang membership, with a paucity of research on the protective factors (McDaniel 2012). This section will outline the risk and protective factors for street gang membership that have been identified.

3.1. Risk Factors for Street Gang Membership

Past research has demonstrated that there are a wide range of risk factors robustly associated with street gang membership. These span each of the five major risk factor domains: the individual, peers, family, school, and community (O'Brien et al. 2013). The risk factors which have been related to street gang membership across each of these domains are summarized in Table 1. Critically, Klein and Maxson (2006) noted that a number of risk factors for street gang membership are supported by weak or

inconclusive evidence. However, it must be considered that the evidence-base for street gang-related risk factors has rapidly grown since Klein and Maxson's (2006) suggestions. Yet, to complicate matters further, research has also suggested differences in risk factors within street gangs. Specifically, core street gang members (i.e., those that self-identify as street gang members) are more likely than peripheral members (i.e., those that engage in street gang crime, but do not self-identify as members) to have early exposure to deviant peer groups, low impulse control, poor academic attainment, and endorse antisocial attitudes (e.g., Alleyne and Wood 2010; Esbensen et al. 2001; Klein 1995; Melde et al. 2011). This suggests peripheral and core street gang members have different needs that require targeting in intervention programs.

The presence of a risk factor does not determine that an individual will join a street gang. Indeed, many of the risk factors for street gang membership also predict other deviant behaviors (e.g., general delinquency and violence; Decker et al. 2013). However, the more risk factors the individual experiences, the higher the likelihood that they will engage in a street gang, beyond any other deviant behavior (Melde et al. 2011). Supporting this accumulative effect, Esbensen et al. (2010) found 11 or more risk factors were experienced by 52% of street gang members, compared with 36% of violent offenders. Street gang members are also more likely to concurrently experience risk factors in each of the major domains than their non-gang counterparts (Thornberry et al. 2003). This suggests that prevention and intervention strategies need to address numerous risk factors across all domains (Howell 2010).

3.2. Protective Factors for Street Gang Membership

In areas with a high presence of street gangs, over 75% of young people successfully avoid becoming members (Howell 2012). This is despite experiencing similar risk factors to those who engage in street gangs, particularly across the school and community domains. As suggested above, individuals who circumvent street gangs may not have accumulated as a high a number of risk factors as those that do become members. Alternatively, these individuals may experience more protective factors than those that do become affiliated with a street gang. In challenging environments, where it may not be possible to remove or reduce all risk factors, focusing on adding protective factors could decrease engagement in street gangs (Howell and Egley 2005).

However, with research predominantly focusing on the risk factors of street gang members, the protective factors have been neglected. The protective factors that have been identified so far span the individual, family, peer, and school domains (for a full summary, see Table 1). Regarding the individual, protective factors for an at-risk young person include having effective coping strategies, high emotional competence, and good social skills (Katz and Fox 2010; Lenzi et al. 2018; McDaniel 2012). For the family domain, protective factors include strong parental monitoring, cohesiveness within the family, and positive parental attachment (Li et al. 2002; Maxson et al. 1998). Interaction with prosocial peer groups is a protective factor within the peer domain (Katz and Fox 2010). Positive child-teacher relationships, clear familial expectations regarding schooling, and an individual's commitment to education are all protective factors in the school domain (Stoiber and Good 1998; Thornberry 2001). Little is known regarding the protective factors for street gang membership in the community domain. Future research examining protective factors is essential, particularly as strength-based approaches to offender rehabilitation have suggested that focusing on these could improve prosocial behavior in street gang members (O'Brien et al. 2013; Whitehead et al. 2007).

Table 1. Examples of risk factors for street gang membership, according to domain.

Domain	Risk Factors	Protective Factors
Individual	Offence supportive cognitions *, negative life experiences *, low self-esteem, internalizing behaviors, externalizing behaviors *, impulsivity, lack of participation in prosocial activities, mental health issues (e.g., Post-Traumatic Stress Disorder, anxiety), negative attitudes towards the future, substance misuse, low empathy, high callous-unemotional traits, low trait emotional intelligence, moral disengagement, negative attitudes towards the police, hyperactivity, poor interpersonal skills, and anger rumination.	Effective coping strategies, high emotional competence, emotion regulation skills, resilient termperament, future orientation, impulse control, low ADHD symptomology, high self-esteem, intolerant attitude towards antisocial behavior, and belief in moral order
Peers	Negative peer influence *, association with delinquent peer group, victim or perpetrator of bullying, alienation from prosocial peers, strong emotional connection to delinquent peers, prioritizing social identity, and peers' substance misuse.	Interaction with prosocial peer groups, strong social skills, low peer delinquency, and prosocial bonding
Family	Poor parental supervision * and monitoring *, lack of attachment to parents, family involvement in street gangs, family involvement in crime, delinquent siblings, hostile family environment, parental substance misuse, inconsistent discipline, low familial socioeconomic status, single-parent households, childhood maltreatment, and running away from home.	Strong parental monitoring, control and supervision, parental warmth, cohesiveness within the family, positive parental attachment, stable family structure, and low levels of parent-child conflict
School	Poor academic attainment, lack of commitment to education, lack of aspirations, unsafe school environment, suspension/exclusion, truancy, inconsistent discipline, victimization at school, inadequate teaching, negative relationships with staff, and difficult transitions between schools.	Positive child-teacher relationships, clear familial expectations regarding schooling, personal commitment to education, positive role models, fair treatment from teachers, safe evironment, connectedness, regular school participation, and academic achievement
Community	Disorganized neighborhood, high rates of crime, exposure to street gangs and violence, availability of firearms, poverty, lack of community resources, and experiencing unsafe environments.	Opportunities for prosocial involvement, positive community role models, perceived neighborhood safety, and low economic deprivation

Sources include: Home Office (2015), Lenzi et al. (2018), Mallion and Wood (2018), Melde et al. (2011), Merrin et al. (2015), O'Brien et al. (2013), Raby and Jones (2016), and Smith et al. (2019). * Risk factors identified by Klein and Maxson (2006) as having a robust evidence-base.

4. Current Approaches to Street Gang Intervention

Street gang membership has typically been targeted through the criminal justice system, including the imposition of street gang injunctions (behaviors or activities of the street gang member are prohibited, such as going to certain areas; HM Government 2016). Whilst research has demonstrated reductions in reoffending rates by recipients of street gang injunctions (Carr et al. 2017), long-term negative effects have also been identified (e.g., reduced opportunities for education and employment, and less access to prosocial networks; Swan and Bates 2017). However, there has been a recent growth in prevention and intervention programs which are psychologically-informed (e.g., O'Connor and Waddell 2015). These programs have more positive long-term outcomes, for both the individual and the community, than criminal justice approaches (Howell 2010), and fit well within a public health framework. This section will outline current approaches to street gang prevention and intervention, across three levels (primary, secondary, and tertiary).

4.1. Primary Prevention

In a public health approach, it is assumed that given the right conditions, any young person could be drawn towards joining a street gang (Gravel et al. 2013). As such, by using a universal approach, primary prevention strategies attempt to protect all young people from engaging in adverse behaviors (such as violence and street gang membership), by reducing risk and increasing protective factors (Gebo 2016). Primary prevention strategies include the provision of services which aim to reach and support a whole community. They are typically delivered via local schools, community outreach, and faith-based organizations (Wyrick 2006). These include ensuring equal access to education, employment, and housing, and improving the community space (i.e., cleaning communal areas and better lighting). Wyrick (2006) suggests these primary prevention strategies enhance community mobilization, which reduces engagement in street gangs.

Primary prevention strategies are commonly implemented in schools, as it is easy to reach a large number of young people prior to the onset of any deviant or delinquent behavior. One of the leading schools-based primary prevention programs for street gang membership is the Gang Resistance and Education Training Program (G.R.E.A.T; Esbensen et al. 2001; Esbensen et al. 2002). G.R.E.A.T is delivered by law enforcement officers to middle school pupils, aged 11–13 years, in the United States. The original version of G.R.E.A.T targeted risk factors not specific to street gang membership, including low self-esteem and unsafe schools (Klein and Maxson 2006). Despite program completers having more pro-social peers, negative attitudes towards street gangs, and fewer risk-taking behaviors, no difference was found between program recipients and non-recipients on levels of delinquency, violence, or street gang involvement (Esbensen et al. 2001).

As such, G.R.E.A.T underwent substantial changes, with the new curriculum comprising of 13 sessions targeting risk and protective factors specific to street gang membership. The Revised-G.R.E.A.T program intended to inoculate young people against street gang membership, through the development of skills (i.e., problem-solving, social and communication skills, self-management, and personal responsibility) and creation of achievable goals (Esbensen 2015). A Randomized Control Trial (RCT) evaluation of the Revised-G.R.E.A.T program found, compared to controls, program recipients were 39% less likely to have become a street gang member at one-year follow up (Esbensen et al. 2012), and 24% less likely at four-years follow up (Esbensen et al. 2013). In addition, program recipients demonstrated less anger and expressed more positive attitudes towards law enforcement (Esbensen et al. 2011).

Recently, Growing Against Gangs and Violence (GAGV) has been implemented as a primary prevention measure in the UK, and is provided in areas prioritized in the Ending Gang and Youth Violence initiative (HM Government 2011). Based on G.R.E.A.T, GAGV aims to build young people's resilience towards street gangs and is implemented universally to school year groups. Consistent with the Revised-G.R.E.A.T program, GAGV promotes skill development, whilst also targeting the 'push' (e.g., fear of victimization and peer pressure) and 'pull' (e.g., protection, friendship, and money)

factors associated with street gang membership (see Densley 2018). However, its focus on raising awareness of street gangs and the associated behaviors is closer to the original version of G.R.E.A.T (Esbensen and Osgood 1999).

Outcomes from an RCT found recipients of the GAGV program had 2.72% lower odds of joining a street gang than non-recipients, at a one-year follow-up. However, this did not reach the criteria to be considered statistically significant, meaning findings should be interpreted with caution (Densley et al. 2016). Critically, this may be due to poor retention and attrition rates at the one-year follow-up. Alternatively, as Wong et al. (2011) suggest, primary prevention strategies, such as the original G.R.E.A.T and GAGV, may not be effective at reducing street gang involvement as they are too generic, often failing to target risk factors most strongly related to street gang membership. Despite this, the focus on wellbeing and personal growth, rather than individual blame (Gebo 2016), means primary prevention programs are perceived more positively by communities, schools, and policy-makers than targeted prevention and intervention strategies (Tita and Papachristos 2010). As such, future research needs to consider which risk and protective factors, specific to street gang members, should be targeted in primary prevention strategies.

4.2. Secondary Prevention

Although primary prevention strategies should stop the majority of young people from joining street gangs, for those that are not 'immunized' (as coined by the National Gang Center 2020) secondary prevention measures represent the next level in anti-gang strategy. Esbensen (2000) suggests secondary prevention efforts are needed which target young people who have displayed problematic behavior and, as such, are at high risk of joining street gangs. As at-risk youths are most likely to face the decision of whether to join a street gang, secondary prevention programs are often considered the most important strategy in reducing street gang involvement (Howell 2010). Yet, systematic reviews and meta-analyses have failed to find a strong evidence-base supporting the effectiveness of secondary prevention strategies at reducing street gang involvement (Lipsey 2009; Wong et al. 2011).

As highlighted in the "Surveillance" section above, one of the key issues faced in secondary prevention strategies is the accurate identification of young people at risk of street gang involvement. Numerous attempts have been made at creating objective measures to identify youths at high risk of joining a street gang (e.g., Hennigan et al. 2014). However, such instruments often suffer from a lack of predictive validity (Gebo and Tobin 2012). As such, secondary prevention strategies are typically targeted at young people who have had contact with law enforcement due to delinquent behavior or those known to have family members or peers in street gangs (Gebo 2016). Such programs tend to be delivered in areas with high rates of street gangs, as exposure to street gangs is a strong risk factor for membership (Public Safety Canada 2007).

Wyrick (2006) suggests three key elements that any successful secondary prevention program requires. Firstly, at-risk youths need access to alternatives to street gang membership, which are appealing, engaging, and socially rewarding. For potential members, street gangs can be perceived as a source of friendship, excitement, and income (e.g., Augustyn et al. 2019). By diverting at-risk youths' attention onto prosocial alternatives, this will reduce their likelihood of engaging in a street gang. Second, programs need to aid at-risk youths with developing effective support systems. Street gangs offer a source of emotional and social support (Alleyne and Wood 2010). If this support is provided through prosocial relationships, the need to become involved in a street gang will reduce. Finally, Wyrick (2006) stresses that at-risk youths should be held accountable, with clear expectations for appropriate behavior set. As street gang members tend to lack of parental monitoring and discipline (Pedersen 2014), establishing appropriate behaviors in at-risk youths will reduce engagement in street gangs. Due to the sheer number of secondary prevention programs available internationally, examples included in this section are limited to those which have shown some success at preventing street gang involvement, including Cure Violence, Montreal Prevention Treatment Program, Los Angeles Gang

Reduction and Youth Development program, and Functional Family Therapy—Gangs (for an extensive review of street gang prevention programs, see O'Connor and Waddell 2015; Wong et al. 2011).

Los Angeles Gang Reduction and Youth Development (GRYD) is a secondary prevention program designed for young people aged 10–15 years, who are at high-risk of joining a street gang. To be eligible for the GRYD program, young people must exhibit two or more of the following risk factors: antisocial tendencies, weak parental supervision, critical life events, impulsive risk taking, guilt neutralization, negative peer influence, peer delinquency, self-reported delinquency, and familial involvement in a street gang (Brantingham et al. 2017). Using a strengths-based approach, the GRYD program aims to increase resilience towards street gang membership by enhancing protective factors (e.g., support from prosocial peers and family). Evaluation of the GRYD program has had positive results, with reduced engagement in violent and street gang-related behavior at six-month follow-up (Cahill et al. 2015), although this effect was stronger for younger and lower-risk participants, who may be less likely to join a street gang anyway. Critically, evaluations conducted on GRYD failed to include a comparison group of at-risk youths who did not participate in the program, meaning changes in behavior may not be caused by GRYD.

A further secondary prevention program, Cure Violence (formerly CeaseFire), is based on the view that violence is a contagious disease which can be prevented by targeting those most at-risk of 'contracting violence' (Skogan et al. 2009). By identifying and treating high-risk youths, intervening in conflicts and changing community norms, it is assumed that this will reduce engagement in street gangs and the associated violent behavior (McVey et al. 2014). Outcome evaluations of Cure Violence have been mixed; a sixteen-year time series analysis found, after implementation of the program, shootings reduced in five of the seven neighborhoods assessed (Slutkin et al. 2015). However, in one Baltimore neighborhood, violence-related homicides increased by 2.7 times following the implementation of Cure Violence (Webster et al. 2012). The inconsistency in findings may be due to problems with program implementation across different neighborhoods (i.e., poor retainment of staff, lack of consistent funding, communication breakdowns, and limited data sharing; Fox et al. 2015). Having been designed in the USA, where rates of gun violence among street gangs are high, Cure Violence places an inordinate focus on reducing gun-related offending (Butts et al. 2015). As such, Cure Violence lacks generalizability to areas such as the UK, where gun-related violence is low (HM Government 2019).

Recently, researchers have explored whether Functional Family Therapy (FFT), an effective and well-evidenced secondary prevention program typically used for adolescent behavioral and substance misuse problems (Hartnett et al. 2016), could be adapted for young people at-risk of joining a street gang (termed FFT-G). FFT involves treating the family as a whole; working towards establishing better communication, family relationships, and minimizing conflict (Welsh et al. 2014). In FFT-G, issues salient to street gang membership are also targeted (e.g., risk factors, retaliatory behavior, and street gang myths). Outcome evaluations have found young people randomly assigned to receive FFT-G had lower rates of recidivism at 18 months follow-up than the control group (Gottfredson et al. 2018), although, this depended on risk level, with program-recipients at highest-risk of street gang involvement having lower recidivism rates than control, whilst lower-risk program-recipients showed no difference in recidivism rates to the control group (Thornberry et al. 2018). This demonstrates that young people who present with the most risk factors are more likely to benefit from FFT-G. Critically, no research has yet been conducted to examine whether FFT-G is any more successful at reducing street gang involvement than the original FFT program.

The Montreal Preventive Treatment Program (Tremblay et al. 1995) has the longest follow-up period (19 years, with regular follow-ups throughout) of a secondary prevention program (Vitaro et al. 2013). The Montreal Preventive Treatment Program is targeted at boys aged 7–9 years who have displayed disruptive behavior. The program comprises a parental training component (e.g., effective behavioral monitoring, crisis management, and positive reinforcement) and a social skills training component for the child (e.g., self-control skills and building prosocial networks; Tremblay et al. 1991). Evidence from RCTs found that program recipients were less likely to have joined a street gang at both 12 and

15 years-of-age than the control group (McCord et al. 1994; Tremblay et al. 1996). Furthermore, at 24 years-of-age, program recipients were more likely to have graduated from high school and less likely to have a criminal record than the control group (Boisjoli et al. 2007). This demonstrates that secondary prevention programs provided when disruptive behavior first emerges can reduce engagement in street gang membership.

4.3. Tertiary Prevention

In situations where primary and secondary prevention programs have not effectively prevented an individual from joining a street gang, tertiary prevention programs can be provided. Tertiary prevention programs target individuals who have already become a street gang member and are aimed at helping them to leave the street gang or making participation in a street gang more challenging (Mora 2020). Typically, tertiary prevention programs are provided to those who are incarcerated or on probation, and have committed an offence related to their street gang membership. However, the provision of tertiary prevention programs is inconsistent, with demand for services far outweighing available resources (Lafontaine et al. 2005; Ruddell et al. 2006). For instance, in the United States alone, it was estimated that 230,000 street gang members were incarcerated in 2011 (National Gang Intelligence Center 2011), meaning the vast majority would not have been able to receive any form of street gang intervention.

Despite this, attempts have been made internationally to develop and implement various tertiary prevention programs for incarcerated street gang members. Typically, prison-based tertiary prevention programs use suppression techniques, such as in-house or legal sanctions for street gang-related behavior and separation from other street gang members. Suppression techniques used to tackle street gang membership are beyond the scope of this paper; for a national analysis see Ruddell et al. (2006). Whilst programs with a therapeutic basis (i.e., providing rehabilitation and support) are offered to a lesser extent in prisons, these are an essential component of a public health approach to street gang membership.

Di Placido et al. (2006) designed a tertiary prevention program for adult street gang members incarcerated in a maximum-security, forensic mental health hospital, which utilized the Risk Need Responsivity (RNR; Andrews et al. 1990) approach to offender rehabilitation. The RNR approach has three key components: (1) risk (treatment intensity should match offenders' risk of recidivism), (2) need (treatment should target criminogenic needs, i.e., factors associated with offending behavior), and; (3) responsivity (treatment style should utilize cognitive social learning methods that are appropriate for each individual offender, accounting for their personal attributes and abilities). In addition, Bonta and Andrews (2007) emphasize professional discretion, whereby clinical judgement can be used to deviate from the previous principles, in exceptional circumstances. The RNR approach is considered the "gold-standard" in offender rehabilitation (Fortune and Ward 2014), with RNR-consistent interventions demonstrating considerable success at reducing recidivism (Andrews and Bonta 2010; Hanson et al. 2009).

At a 24-month follow-up, treated street gang members were less likely to have reoffended violently by 20% and non-violently by 11% than untreated matched controls. In addition, treated street gang members committed fewer major institutional offences than controls. Whilst this program shows promise, the extent to which street gang membership continued post-treatment was not examined; meaning it is not possible to determine whether Di Placido et al.'s (2006) RNR approach is effective at reducing street gang involvement. Furthermore, the RNR approach has been repeatedly criticized for its demotivating nature and limited focus on non-criminogenic needs and therapeutic alliance (Case and Haines 2015; Ward et al. 2007), which are critical factors for providing an effective street gang intervention (Chu et al. 2011; Roman et al. 2017).

A new tertiary prevention program provided in the UK is Identity Matters (IM). Unlike Di Placido et al.'s (2006) program, IM was designed for use in both prison and community settings. IM is targeted at adults whose offending behavior is motivated by identification with a group or street

gang (Randhawa-Horne et al. 2019). Based on Tajfel and Turner's (1986) Social Identity Theory, IM assumes that offending behavior occurs as a result of "over-identification" with the group. Specifically, individuals develop a collective sense of identity based on their group membership. The ingroup is viewed more favorably than outgroups, with group members holding an "us" versus "them" perspective. When social identity is salient, an individual's behavior is guided by group norms (Hogg and Giles 2012). For street gang members, group norms typically include aggressive and violent behavior (Hennigan and Spanovic 2011).

IM consists of 19 structured and manualized sessions which aim to address participants' offence-supportive cognitions, whilst strengthening their sense of personal identity. To date, only one study has been conducted on IM, which consisted of a small-scale process study examining short-term outcomes of a four-site pilot (Randhawa-Horne et al. 2019). Interviews with 20 program completers (14 incarcerated offenders and 6 on probation) were generally positive regarding the content of IM, with the majority recommending no changes. In particular, sessions which explored 'push' (i.e., community disorganization, poverty, unemployment) and 'pull' (i.e., financial gain, status, and protection) factors, desistance, identity, and commitment to change were perceived as most beneficial to participants.

IM was piloted in both a group and one-to-one format. One-to-one sessions were found to be most successful, as participants were more engaged and the program could be tailored to the individuals' needs. However, as discussed previously, demand for IM is high and far outweighs the staffing and time needed to provide the program. Despite this, the safety concerns regarding bringing together members of opposing street gangs for a group-based intervention may overshadow the benefits of increasing recipient numbers. Prison was perceived as the most suitable environment for delivery of IM, with a lack of stability in the community, particularly surrounding accommodation and employment, leading to difficulty in intervention delivery. Pre-post measures showed an increase in participants' understanding of the positive consequences of staying crime-free and negative outcomes from engaging in crime. However, with a lack of control group and small sample size, it is not possible to determine whether the observed changes occurred as a result of engaging in IM. Furthermore, long-term outcome studies need to be conducted to examine whether any changes are maintained post-intervention. Alike Di Placido et al.'s (2006) research, evaluations have not yet been conducted on street gang engagement following receipt of IM; meaning it is not possible to deem this an effective tertiary prevention program.

A number of limitations were highlighted concerning the implementation of IM. Firstly, both facilitators and participants expressed difficulty surrounding the language used in IM. For instance, using the terminology "group", whilst avoiding the term "gang", led to a lack of clarity surrounding the purpose of the intervention. Second, participant motivation was identified as key to intervention success. As street gang members have notoriously poor motivation to engage (Di Placido et al. 2006), interventions should be personally meaningful, positively-oriented, and intrinsically motivating (Fortune 2018). Therefore, the negative orientation of IM (i.e., focusing on harmful past behaviors) is unlikely to improve participants' motivation to engage in the intervention. Third, therapeutic alliance deteriorated throughout the intervention, which is concerning considering past research has consistently demonstrated that a good client-therapist relationship improves the effectiveness of interventions (Gannon and Ward 2014). Fourth, IM is only accredited for use with adult offenders (Ministry of Justice 2020). This is despite the majority of members joining street gangs during adolescence (Pyrooz 2014), which is a period characterized by an increased focus on peer relationships (Young et al. 2014), and high salience of social identity (Tanti et al. 2011). Therefore, an intervention which targets social identity, such as IM, may be more appropriate for young offenders.

Whilst the majority of tertiary prevention strategies are provided in prison settings, as demonstrated in IM these can also be provided in the community. Multi-Systemic Therapy (MST; Henggeler et al. 1992) is a home-based intervention for adolescents, aged 12–17 years, that have engaged in offending behavior (Mertens et al. 2017). According to MST, deviant behavior is a product of the proximal

systems (i.e., family, peer groups, school, and community) that the young person belongs to. As such, MST focuses on risk factors within (e.g., parent-adolescent communication) and between (e.g., parent communication with school) these systems (Henggeler and Schaeffer 2016). As completion of an MST program has been associated with long-term reductions in recidivism (Sawyer and Borduin 2011) and increased contact with prosocial peers (Asscher et al. 2014), it has been recommended as a tertiary prevention program for street gang members (Madden 2013; O'Connor and Waddell 2015).

Findings regarding the effectiveness of MST for street gang members have been mixed. For instance, Boxer et al. (2015) found treatment completion rates were lower for justice-involved youths who self-identified as street gang members (38%), compared to their non-gang counterparts (78%). In particular, street gang members were less engaged in the MST program and were more likely to be removed from the program due to a new arrest (Boxer 2011). Success of MST is partially mediated by reduced contact with delinquent peers (Huey et al. 2000). As ties to a street gang tend to be strong and challenging to break (Decker et al. 2014), it is possible that MST therapists had difficulty reducing the young person's engagement in the street gang (Boxer et al. 2015); reducing overall program effectiveness. Furthermore, street gangs provide access to social and emotional support (Alleyne and Wood 2010), meaning members interpret the street gang as a positive peer network. As MST encourages the formation of positive peer networks, street gang members may be reluctant to leave their street gang (Boxer et al. 2015).

Despite limited support regarding the short-term effectiveness of MST for street gang members, findings examining the longer-term effects have been more positive. Specifically, at one-year follow-up, no difference was found between street gang members and non-gang youths on number of, or time to, re-arrest (Boxer et al. 2017). This suggests that MST appears to have a 'sleeper effect', whereby it is equally effective at reducing recidivism, over a longer time period, in street gang members as non-gang youths. This may be because reducing engagement with a street gang takes time, so changes in behavior will not be seen immediately. However, MST is a relatively novel tertiary prevention program for street gang members, meaning further research is necessary to establish program effectiveness. In general, this section has demonstrated that the evidence-base for tertiary prevention programs is minimal. As such, there is currently no 'gold-standard' approach to intervening with street gang members (Boxer and Goldstein 2012).

5. Good Lives Model as a Public Health Framework

The programs reviewed above represent just a small fraction of the wide range of street gang interventions available. Whilst some interventions are emerging as being effective at preventing or reducing street gang involvement, the vast majority suffer from a weak or limited evidence-base. Critically, there is a lack of consistency in the provision of intervention programs for street gang members across communities. Also, Wood (2019) suggests current prevention and intervention strategies are limited by a number of therapeutic issues. Specifically, the benefits of belonging to a street gang (e.g., protection, social and emotional support, sense of identity; Alleyne and Wood 2010) extend beyond the typical proceeds of crime (i.e., financial and material gain), and are not adequately targeted in interventions. In addition, street gang members' mistrust and lack of motivation frequently hinder intervention efforts (Di Placido et al. 2006). The Good Lives Model (GLM; Ward and Brown 2004), a novel approach to offender rehabilitation, can provide a framework for street gang interventions which overcomes these obstacles.

The GLM assumes offending behavior occurs when obstacles prevent the attainment of a meaningful and fulfilling life through prosocial means (Yates et al. 2010). In order to achieve a meaningful and fulfilling life, all humans are naturally predisposed to seek goals fundamental for survival, social networking and reproducing (Laws and Ward 2011). Purvis (2010) proposed 11 universal goals (termed primary goods) which contribute to an individual's wellbeing, happiness, and sense of fulfilment (Ward and Fortune 2013). For a summary of primary goods, see Table 2. Any means necessary and available can be utilized in an effort to attain these primary goods, including both

prosocial and antisocial behaviors. For example, the primary good of Community can be fulfilled through prosocial (e.g., volunteering in the local area) or antisocial methods (e.g., joining a street gang). When antisocial methods are used, it is unlikely that an individual will have a truly meaningful and fulfilling life, as the primary goods are under continuous threat. For instance, street gangs provide members with a sense of safety, protection, and support (Hogg 2014), which are needed to fulfil the primary good of Inner Peace. Yet, at best, Inner Peace will be fulfilled briefly, as street gang membership increases an individual's risk of violent victimization and mental illness (Taylor et al. 2008; Watkins and Melde 2016).

Table 2. Eleven Primary Goods and Definitions (Yates et al. 2010).

	Primary Good	Definition
1	Life	Incorporates basic needs for survival, healthy living, and physical functioning.
2	Knowledge	Aspiration to learn about and understand a topic of interest (including, but not exclusively, oneself, others, or the wider environment).
3	Excellence in Work	Pursuing personally meaningful work that increases knowledge and skill development (i.e., mastery experience).
4	Excellence in Play	Desire to pursue a leisure activity that gives a sense of achievement, enjoyment, or skill development.
5	Excellence in Agency	Autonomy and independence to create own goals.
6	Community	A sense of belonging to a wider social group, who have shared interests and values.
7	Relatedness	Developing warm and affectionate connections with others (including intimate, romantic, and family relationships and friendships).
8	Inner Peace	Feeling free of emotional distress, managing negative emotions effectively and feeling comfortable with oneself.
9	Pleasure	Feeling happy and content in one's current life.
10	Creativity	Using alternative, novel means to express oneself.
11	Spirituality	Having a sense of meaning and purpose in life.

Four obstacles have been identified which cause difficulty in obtaining primary goods (Ward and Fortune 2013). Firstly, as discussed above, the use of inappropriate or antisocial means leaves an individual feeling frustrated at their inability to fully secure the primary goods. Second, the primary goods being sought can conflict, or lack coherence, with one another. For example, the primary goods of Community and Excellence in Agency conflict when street gang members focus on group norms, which contradict their personal goals. Third, a lack of scope occurs when primary goods are neglected. For instance, street gang members neglect the primary good of Life (i.e., poor sleep hygiene, lack of routine, reliance on takeaways), in order to spend time with the gang. Fourth, external (e.g., poverty, lack of job opportunities, disorganized neighborhood) and internal obstacles (e.g., impulsivity, low empathy, endorsement of moral disengagement strategies) result in prosocial methods of attaining primary goods being inaccessible.

Critically, the GLM does not specify how to treat street gang members. Rather, it provides a framework which guides the development and implementation of evidence-based interventions (Ward et al. 2011). Specifically, any GLM-consistent intervention should begin by creating a Good Lives Plan, which identifies an individual's skills, the primary goods being sought, and any obstacles they face (for an overview of GLM case formulation, see Fortune 2018). Aligned with a public health approach, GLM-consistent interventions are framed in a manner that promotes well-being, by focusing on achieving personally meaningful goals using prosocial methods (Ward and Fortune 2013). To support the use of prosocial methods, GLM-consistent interventions aim to develop an individual's internal (i.e., skills and values) and external capacities (i.e., resources, support, and opportunities; Ward and Maruna 2007). The GLM framework can guide primary, secondary, and tertiary programs (see Table 3).

Table 3. Utilizing a Good Lives Model (GLM) framework for Primary, Secondary, and Tertiary Prevention Programs.

Stage of Intervention	Overview	GLM Framework
Primary prevention	Universal prevention programs, provided prior to the onset of street gang membership.	Consistent with the GLM framework, primary prevention programs assist young people (regardless of their risk for street gang involvement) to achieve their primary goods through prosocial means. This involves developing the internal capacity skills necessary for primary good attainment. For instance, school-based programs supporting the development of social skills, goal-making, and emotional competencies can aid in the fulfilment of Relatedness, Excellence in Agency and Inner Peace. In addition, external obstacles that prevent attainment of primary goods need targeting. For example, mobilizing communities, providing opportunities (e.g., youth groups and employment), and reducing poverty will enable the fulfilment of primary goods through prosocial means.
Secondary prevention	Selected prevention programs, targeting individuals who have been identified as at greater risk of joining a street gang.	Utilizing a one-to-one format, secondary prevention programs should begin with a GLM-consistent case formulation. This involves identifying which primary goods are most important to the individual, the means they have available to them, their personal strengths and skills, and any obstacles faced in the pursuit of primary goods (Fortune 2018). This can guide the decision-making process regarding which interventions are most suitable for the individual. For instance, FFT-G will be most appropriate for an individual who is having difficulty attaining the primary good of Relatedness, due to family conflict. Comparatively, an individual who is unable to achieve Inner Peace, because of mental health issues, may respond better to a cognitive-behavioral intervention. As individuals at risk of street gang membership are likely to face obstacles across many of the risk domains (i.e., individual, family, peer, school, and community), a multidisciplinary approach will be necessary to ensure all internal and external obstacles are targeted.
Tertiary intervention	Indicated interventions, targeting individuals who have already joined a street gang.	For a street gang member, the perceived benefits of belonging to a street gang (e.g., financial gain, protection, camaraderie), may outweigh the costs (e.g., risk of violent victimization and incarceration). As such, it is important to identify, in case formulation, which primary goods an individual is trying to attain through street gang membership. Again, this informs the selection of appropriate interventions. Tertiary interventions should focus on providing alternative means of achieving the primary goods, without needing to rely on street gang involvement. Similar to secondary prevention programs, this will necessitate a multidisciplinary approach focusing on internal skill development and provision of external resources. Critically, GLM-consistent tertiary interventions must be positively framed; focusing on the strengths and goals of the individual, rather than their risk of returning to the street gang.

By utilizing a GLM framework, this can enhance existing evidence-based interventions for street gang members. GLM-consistent interventions are strengths-based and goal-focused, which enhances motivation and engagement with the program (Fortune 2018). In addition, as GLM-consistent interventions are positively framed, therapists are encouraged to be empathic and respectful towards clients (Barnao et al. 2015). This supports the development of a strong, trusting therapeutic alliance (Ward and Brown 2004); overcoming issues of high drop-out rates, low therapeutic alliance, and poor client engagement typically seen in street gang interventions. As the GLM has quickly become a favored and widely applied framework for offender rehabilitation internationally (McGrath et al. 2010), using a GLM framework could enable consistency in street gang interventions across communities.

However, as a relatively new framework, empirical evidence regarding GLM-consistent interventions remains in its infancy (Mallion and Wood 2020a; Netto et al. 2014), and is primarily focused on interventions for individuals who have sexually offended (Lindsay et al. 2007; Gannon et al. 2011). Whilst the assumptions of the GLM have been theoretically applied to street gang members (Mallion and Wood 2020b), to date, interventions that are GLM-consistent have not yet been implemented with street gang members. Despite this, the GLM has been successfully applied to young (e.g., Chu et al. 2015; Print 2013; Van Damme et al. 2016) and violent offenders (Whitehead et al. 2007). As street gang members are typically young and engage in violent behavior (Pyrooz 2014; Wood and Alleyne 2010), this supports the use of GLM-consistent interventions with this population.

6. Conclusions and Future Directions

There has been a recent shift from viewing street gangs as a problem for law enforcement to considering street gangs as a priority for public health (Catch22 2013). The public health approach emphasizes the role of research in understanding the *causes* of street gang membership, with this informing the development of primary prevention, secondary prevention, and tertiary intervention programs (McDaniel et al. 2014). Whilst research regarding the risk factors for street gang membership has rapidly grown over the past decade, the protective factors preventing involvement are still relatively unknown (McDaniel 2012). As a large number of young people successfully avoid joining street gangs, future research should focus on understanding protective factors which could guide street gang prevention and intervention programs.

A key component of a public health approach involves conducting methodologically sound evaluations of street gang prevention and intervention programs. Whilst this review has demonstrated that some programs are beginning to show promise at reducing street gang involvement (e.g., G.R.E.A.T, FFT-G), the majority of programs lack methodologically sound evaluation (i.e., no control group, reliance on pre-post measures). Furthermore, the use of different definitions of street gang membership across communities has impeded the consistent implementation of prevention and intervention strategies, resulting in mixed findings regarding program effectiveness (e.g., Cure Violence). Thus, to support consistency in the implementation of prevention and intervention programs, it is recommended that the Eurogang definition is used to guide a public health approach to street gangs. Furthermore, in the future, regular evaluations should be embedded into prevention and intervention programs to examine their effectiveness at reducing street gang involvement.

Critically, prevention and intervention programs often suffer from a lack of theoretical foundation and clear goals or objectives (Klein and Maxson 2006; McGloin and Decker 2010). This can be overcome by using the GLM framework to guide evidence-based prevention and intervention strategies for street gang members. The GLM assumes that improving an individual's internal skills and external opportunities will support them in attaining their primary goods through prosocial means. If these primary goods are effectively secured, this will reduce the need for young people to engage with a street gang. As the GLM is a model of healthy human functioning (Purvis et al. 2013), it can be utilized across all stages of prevention and intervention. Whilst past research has theoretically applied the

GLM to street gang members ([Mallion and Wood 2020b](#)), future research is needed to empirically examine the application of a GLM framework to street gang prevention and intervention programs.

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Article

Exploring the Influence of Drug Trafficking Gangs on Overdose Deaths in the Largest Narcotics Market in the Eastern United States

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Abstract: Research has found that drug markets tend to cluster in space, potentially because of the profit that can be made when customers are drawn to areas with multiple suppliers. But few studies have examined how these clusters of drug markets—which have been termed "agglomeration economies"—may be related to accidental overdose deaths, and in particular, the spatial distribution of mortality from overdose. Focusing on a large neighborhood in Philadelphia, Pennsylvania, known for its open-air drug markets, this study examines whether deaths from accidental drug overdose are clustered around street corners controlled by drug trafficking gangs. This study incorporates theoretically-informed social and physical environmental characteristics of street corner units into the models predicting overdose deaths. Given a number of environmental changes relevant to drug use locations was taking place in the focal neighborhood during the analysis period, the authors first employ a novel concentration metric—the Rare Event Concentration Coefficient—to assess clustering of overdose deaths annually between 2015 and 2019. The results of these models reveal that overdose deaths became less clustered over time and that the density was considerably lower after 2017. Hence, the predictive models in this study are focused on the two-year period between 2018 and 2019. Results from spatial econometric regression models find strong support for the association between corner drug markets and accidental overdose deaths. In addition, a number of sociostructural factors, such as concentrated disadvantage, and physical environmental factors, particularly blighted housing, are associated with a higher rate of overdose deaths. Implications from this study highlight the need for efforts that strategically coordinate law enforcement, social service provision and reductions in housing blight targeted to particular geographies.

Keywords: drug markets; gangs; opioids; overdose; spatial concentration; generalized cross-entropy

1. Introduction

Urban areas in the United States, particularly those with high poverty levels, often experience two significant public health concerns: high levels of drug overdose deaths (OD) and gun violence. For some cities, these public health issues are intertwined and rise to epidemic proportions, greatly diminishing quality of life for residents and incurring billions of dollars in economic losses related to addiction treatment, criminal justice involvement, health care, and lost productivity. Particularly with open-air drug markets, research has noted that violence may emanate from drug trafficking

gangs[1] and groups that compete for territory and clients (Harocopos and Hough 2012; Johnson 2016; Valasik and Tita 2018). In general, research has found that gang corners used for open-air drug distribution have high rates of violence, and rates are even higher if multiple gangs have contiguous or overlapping territories for drug distribution (Taniguchi et al. 2011).

Neighborhoods with many gang corners for drug distribution likely means more *and* easier access to illegal drugs for clients. Rather than competition driving away customers and driving down prices, research has shown that drug markets are another example of "agglomeration economies", which provide benefits by co-locating similar facilities (Taniguchi et al. 2009)—meaning more dealers, more customers, and more profit in one area. Coupled with the exponential growth in recent years of the illegal manufacturing and sale of fentanyl—a synthetic opioid 100 times more potent than morphine—and strict limits on prescription opioids, drug gangs have no shortage of clients seeking cheap options for opioids on the illegal market. Research confirms that increased availability of the typical street drugs such as heroin and cocaine, now supplemented or cut with fentanyl and its analogs, has led to increases in drug-related fatalities in many places, urban and rural alike (Armenian et al. 2018; Han et al. 2019).

In some areas, accidental deaths from overdose may be co-located with outdoor drug markets. Recent research suggests that many opioid misusers, in particular, use drugs near locations of drug purchase rather than at their homes (Bates et al. 2019; Metraux et al. 2019). Law enforcement reports and anecdotal evidence also suggest a contemporary link between drug market locations and deaths from drug overdose given the powerful lure of inexpensive drugs and high-quality heroin in some jurisdictions. Unsuspecting buyers may be purchasing more potent and dangerous substances, and using the drugs on the street soon after purchase, leading to accidental overdose (DEA 2018; Lieberman et al. 2020; Pardo et al. 2019). Research is needed that more closely examines the spatial nature of deaths caused by overdose and how overdose fatalities are related to the location of gangs that sell large quantities of drugs. There are potentially novel opportunities for coordinated policy responses that can address both issues simultaneously.

The current paper examines the spatial relationship between the locations of gangs that control drug trafficking and the locations of fatalities from accidental drug overdose. We apply the framework of environmental criminology (Brantingham and Brantingham 1981) to assess this relationship. We consider factors related to social disorganization theory (Shaw and McKay 1942) and the routine activities perspective (Cohen and Felson 1979) to provide context and opportunity for drug use and misuse tied to neighborhoods and places. We first explore the spatial dimensions of drug fatalities over a number of years, along with potential changes to help inform an environmental analyses of factors associated with OD locations.

We focus our study on a large area within the northeastern U.S. city of Philadelphia, Pennsylvania—the neighborhoods of Fairhill and Kensington—where ODs and gun violence have been increasing steadily over the last five years. These neighborhoods, not surprisingly, are characterized by years of disinvestment, concentrated poverty, and poor physical conditions. The average income among residents of Kensington-Fairhill was $12,669 for 2012 through 2016—approximately half of the average income for residents of Philadelphia as a whole (Confair et al. 2019). In these neighborhoods, all open-air drug markets are gang controlled, and tied to street corners. We seek to answer the following questions: Are ODs clustered around these drug trafficking organization (DTO)-controlled corners? Does the extent of clustering change over time or is it relatively stable? In addition to the DTO locations, what socioeconomic factors and physical environmental features of the landscape are associated with the location of ODs? We take into consideration how these DTO corners are nested within the larger ecological context of neighborhoods and how small areas can provide their own opportunities to attract

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[1]   We use the terms "drug gang" and "drug trafficking organization" interchangeably in this work, although law enforcement agencies in Philadelphia more often use the term "drug trafficking organization" to describe the groups operating in this drug market.

individuals seeking to purchase and use drugs. Overall, our intent is to advance the small, but growing literature on risky environments for substance use and misuse (Mennis et al. 2016), while specifying how particular constructs in environmental criminology can be integrated into that literature.

2. Background

2.1. Drug Overdose Deaths and Philadelphia

In the US, the number of ODs is four times higher today than it was in 1999, with overdoses representing the leading cause of injury-related death among adults (CDC 2020). The use of opioids is fueling the trend, which persists across all age groups, genders, and racial/ethnic groups (Olsen 2016). In Philadelphia, the increasing trend mirrors that of the U.S. as a whole. Among the largest U.S. cities, however, Philadelphia ranks at the top, with more ODs in 2019 than any big city, claiming 1150 victims (Whelan 2020).

The Kensington-Fairhill area of Philadelphia has been referred to as the largest open-air heroin market on the East Coast of the United States (Percy 2018) and data from the U.S. Federal Bureau of Investigation (FBI) confirm that Philadelphia is a leading regional and multistate supplier for high-grade heroin (Roselli 2018). The extensive reach of the Kensington-Fairhill area DTOs is evidenced by the amount of drugs from Kensington-Fairhill found outside of this area of the city—a three-month snapshot of victims of drug overdose from January through March of 2018 in the four counties surrounding Philadelphia identified fifteen different heroin stamps linked directly to Kensington suppliers (Roselli 2018).

Opiates such as heroin have increasingly been supplanted by synthetic opioids as a major driver of overdoses in Philadelphia and elsewhere (Pardo et al. 2019). Beginning in 2013, the U.S. as a whole has seen a large increase in ODs from synthetic opioids, largely illicitly-manufactured fentanyl. The influence of fentanyl on ODs cannot be overstated. Between 2013 and 2014, the age-adjusted rate of ODs from opiate pain relievers and heroin increased by 9% and 26% respectively, and the rate of death from fentanyl has seen large increases as well (Rudd et al. 2016). In 2018, fentanyl was the leading cause of opioid ODs in the U.S. over heroin and prescription painkillers (NIDA 2020). Similarly, the number of drugs seized by law enforcement in the U.S. that tested positive for fentanyl increased by 291% between 2015 and 2017 (DEA 2019). Because profit potential and demand for opiates is so high in the U.S., it is not difficult to surmise that there are always heroin and fentanyl drug trafficking organizations and gangs willing to fill voids in production or supply left by changing legislation or enforcement efforts.

2.2. Spatial Distribution of Overdose Deaths

Although small-area geographic studies of crime and violence are common, studies examining the geographic distribution of ODs are not. This might be because drug misuse is theorized to be mostly attributed to individual-level and interpersonal factors, as opposed to environmental factors (Connell et al. 2010; Mennis et al. 2016). There is reason to believe that drug overdoses are not uniformly distributed throughout space, particularly given the inequitable distribution of what (Mennis et al. 2016) term "risky substance use environments" (p. 3). Offering a profile of these risky environments, the authors cite features of places that increase access to substances (such as environments in close proximity to illicit drug markets), high in disadvantage and disorder, or low in cohesion as facilitating drug use initiation or producing stressful conditions for which drug use is used as a coping mechanism (Mennis et al. 2016). Much aligned with the environmental criminology literature, they note that both detrimental and prosocial features of environments, such as density of alcohol establishments and high crime (detrimental), and access to greenspace, libraries and other public resources (prosocial), are inequitably distributed across communities, producing similar inequities in substance use and abuse.

The rapidly-rising number of ODs associated with illegally-obtained opioids sold by drug trafficking gangs in Philadelphia creates a unique opportunity to test whether ecological structures and physical features of the environment help uncover spatial patterns that could have implications for policies and practices by criminal justice stakeholders as well as public health officials and practitioners. Furthermore, evidence of the concentration or co-location of two issues that have serious consequences for the well-being of communities would call for collaboration across government and community stakeholders.

We know from the criminological literature that open-air markets are associated with a variety of highly-visible problems, such as quality-of-life issues and violence (Harocopos and Hough 2012; Johnson 2016; Stevens and Bewley-Taylor 2009; Taniguchi et al. 2011). Studies conducted in Philadelphia at the Census block group level found that factors related to the social disorganization of neighborhoods (income level, vacant properties, female-headed households, residential instability, etc.) had more salience with regard to the location of drug markets than factors representing the routine activities perspective—such as the presence of attractors and generators of crime (McCord and Ratcliffe 2007). Research by Weisburd and colleagues examining environmental factors related to high-crime street segments found that street segments characterized by drug sales also experience high levels of social disorganization (Weisburd et al. 2010).

As ODs are being connected to drug-dealing locations, and there is evidence that opioid deaths cluster to a similar or even greater extent as compared to crime events (Carter et al. 2019), more research is being done to understand the environmental context of overdose deaths. Studies using relatively large units of analysis, such as the community or neighborhood, find clustering of ODs in relation to particular contextual and environmental features. In a 2005 study of 59 community districts (CDs) in New York City, Hembree and colleagues found a relationship between external and internal (e.g., windows, stairways, heating problems) environmental features of the neighborhood and accidental ODs. CDs that had more dilapidated or deteriorating buildings, window or stairway problems, structural fires, and housing with toilet, heating, or peeling paint issues were likely to have more ODs and those with a higher percentage of acceptably clean streets were likely to have fewer (Hembree et al. 2005), showing a potential facilitating role for the neighborhood-level physical environment in terms of ODs.

Recent research in Philadelphia by Johnson and Shreve (2020) examined the geographic distribution of drug overdose mortality at the ZIP code level, and found that fatal drug overdose counts significantly varied across ZIP codes. Testing constructs related to social disorganization, police surveillance, and physical environmental features, they found that overdose mortality was consistently related to neighborhood disadvantage and racial composition (percent White), and the overdose mortality of surrounding neighborhoods. In addition, overdose mortality was also positively associated with police activity for low-level crimes and with negative aspects of the built environment (unsafe and vacant housing, demolitions, and older housing stock) (Johnson and Shreve 2020). Other research has focused on units of analyses smaller than the neighborhood or ZIP code level, hypothesizing that place-based studies at the Census block group level or smaller are better able to capture important variation in places. A study by Li and colleagues (2019) used Census block groups to examine the relationship between features of the built environment with heroin-related emergency calls in Cincinnati, OH from 2015 to 2019. The authors found that, in addition to certain sociodemographic and population features (population age, gender, education, and median household income), heroin-related ODs were positively related to the proportion of parks and commercial, manufacturing, and downtown development zones within block groups. The distance to pharmacies also had a positive association with the emergency medical service (EMS) calls for drug overdose, while number of fast-food restaurants, distance to hospitals, and distance to opioid treatment programs were negatively associated with overdose mortality (Li et al. 2019).

Research has also studied these features at more than one environmental level to determine how spatial scales factored into overdose deaths. Headley Konkel and Hoffman (2020) examined the effects of both the neighborhood (block-level) and immediate (parcel-level) context on fatal drug overdoses in a non-urban Midwestern jurisdiction from 2014 to 2017. Using hierarchical linear modeling, they found

that income inequality, residences of gang members, and the absence of bars predicted all overdoses at the block level, and sex offenses, drug arrests, and the presence of a drug house predicted ODs at the parcel level. They noted the counterintuitive finding related to bars, suggesting that the guardianship from bar management and the presence of other patrons may discourage illegal drug consumption.

In summary, the handful of studies seeking to uncover a relationship between overdose mortality and aspects of the physical and socioeconomic environment has demonstrated a link to certain environmental features, yet this research remains in its infancy, with studies using various units of analyses. Building on the work of the previous studies, we continue to apply a theoretical lens related to crime opportunity at places—in particular social disorganization theory and routine activity theory—to understand the importance of environmental factors for the anti-social behavior of drug misuse, with a focus on the location of drug trafficking gangs. Social disorganization theorists posit, and research has confirmed, that disadvantaged neighborhoods lack the ability to foster informal social control, thereby facilitating increased opportunities for crime (Bursik and Grasmick 1993). The routine activities perspective focuses more on how the daily routines of persons linked to places influence opportunity for crime. Daily patterns of life generate changes in the flow of potential victims and offenders that can facilitate or inhibit the opportunity for crime (Felson 1987, 1994). With regard to drug markets and accidental overdose, the victims are those purchasing and using drugs. In this study, most victims are traveling to the study area from other neighborhoods (Friedman et al. 2019). The perspective provides the framework to understand how facilities or block features can be attractors or generators for the establishment and maintenance of drug markets at corners—in effect increasing the likely convergence of dealers and purchasers/users (Taniguchi et al. 2009).

Federal and state law enforcement investigators in Philadelphia have noted the modus operandi of drug consumers is to use the product shortly after purchase, regardless of whether they are a walk-up or drive-up customer (Haigler and Francis 2020). The current study examines spatial relationships at a very small geographic level—the Thiessen polygon—to capture the unique contribution of the location of drug gangs to accidental ODs. The routine activities of DTOs would be closely tied to where targets (i.e., users) are located, creating an environment that is beneficial to both sellers and users. If these users consume dangerous drugs near their place of purchase, overdose mortality likely will be higher in places closer to point of sales, and likely clustered within an area closest to the majority of drug-selling gangs. The current study investigates these hypotheses.

3. Methods

3.1. Target Area

As described above, the focus of this work is on the neighborhood of Kensington-Fairhill, which is part of the larger Kensington area, located in the northeastern portion of Philadelphia. The area comprises approximately 1.4 square miles, with a population size of nearly 38,000 people[2], the majority of whom are Puerto Rican[3] (Friedman et al. 2019). In 2018, concern over rising opioid overdose deaths was the mainspring for the mayor of Philadelphia's executive order declaring a disaster in the neighborhood (Exec. Order No. 3–18 2018).[4]

In addition to rising overdose deaths, as stated earlier, the area also experiences deep structural disadvantage and high violent crime, with approximately double the population below the federal poverty line than for the city as a whole.[5] The area itself is marred by physical decay as a result of deindustrialization over the past century, which (Friedman et al. 2019) note "represents a perfect

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[2] This figure is a weighted count using the 2014–2018 ACS 5 year average and areal interpolation procedures described further in this section.

[3] From the 2014–2018 ACS 5 year average, 72% of the total weighted population in the target area are ethnically Hispanic or Latino, and of this group, 78% are Puerto Rican.

[4] https://www.phila.gov/ExecutiveOrders/Executive%20Orders/eo99318.pdf.

[5] According to the 2014–2018 American Community Survey, 54% of the population in Kensington were below the poverty line, compared to 25% in the city as a whole.

environment for harboring difficult-to-police drug markets, sex work, drug consumption shooting galleries, and homeless squats" (p. 7). The authors' recent ethnographic work in the neighborhood documents how structural disadvantage and the ethno-racial makeup of the community positions it to be a hub for the illicit narcotics trade, and consequently, violent crime (Friedman et al. 2019). Spending nearly half a decade in a 10-block area encompassing much of our target area, they found that the ethnic makeup of this neighborhood provides a neutral meeting ground for black and white users to purchase their product without drawing too much attention. Indeed, they found that most of the buyers were not residents themselves, but users coming to the local drug markets from outside the neighborhood.

3.2. Spatial Unit

As the focus of our research is on drug trafficking corners, we use Thiessen polygons as our unit of analysis, a network of which is constructed around street corners in the target area of Kensington-Fairhill. A Thiessen polygon is a geometric unit that contains all geographic space closest to its centroid (street corners) than any other polygon's centroid (Chainey and Ratcliffe 2005; Taniguchi et al. 2011). A Thiessen polygon network was used for both theoretical and practical reasons. From a theoretical standpoint, street corners are central hubs of activity for gangs in general and open-air drug markets (Whyte 1955; Topalli et al. 2002; Hsu and Miller 2017). It has long been acknowledged that gangs conduct their day-to-day operations at smaller geographic scales than neighborhoods, Census tracts, or the full extent of their territory (Tita et al. 2005; Valasik and Tita 2018). Commonly called their "set spaces", gangs may choose the places (e.g., street corners) where they hang out and conduct their daily activities, including selling drugs, based on a variety of factors related to the built environment or the relative locations of other gangs' set spaces (Tita et al. 2005; Valasik and Tita 2018). This study echoes prior research that has used Thiessen Polygons as units approximating gang-drug corners within larger set spaces (Taniguchi et al. 2011).

More practically, Thiessen polygons centered around street corners allow for aggregating point data to the nearest corner, reducing potential bias resulting from coding errors (Weisburd et al. 1994). Relatedly, Thiessen polygons are tessellated, ensuring observations are assigned to independent units. Thiessen polygons have been used in previous studies of crime, e.g., (Ratcliffe et al. 2011; Haberman 2017; Piza and Gilchrist 2018). The target area for this analysis was composed of 533 Thiessen polygons, representing approximately 2.5% of the street corners in the city. For the remainder of the article, we use Thiessen polygons and street corner units interchangeably.

3.3. Data and Measures

3.3.1. Dependent Variable

The outcome measure of interest for the current study is accidental drug overdose deaths occurring in each Thiessen polygon in the target area. We examined these data for the period between 1 January 2015 and 31 December 2019, with the multivariate analyses focused on the two-year period from 2018 to 2019. Accidental OD incidents were obtained deidentified from the Drug Enforcement Administration (DEA). These data are not restricted to opioid-related deaths. Among other indicators, these data included information on the address of the overdose event location, as well as the death location. Because we are interested in where overdoses are taking place, we focus on the overdose event location, and thus our discussion of OD incidents throughout the paper refers to accidental OD *events* that took place within the city of Philadelphia, but these events all eventually resulted in a death. We used ArcGIS Pro 2.6.0 software to geocode OD incidents occurring in Philadelphia, resulting in a citywide hit rate of 95%, exceeding commonly-referenced standards (Ratcliffe 2004).[6] All OD incidents occurring within Kensington-Fairhill were subsequently aggregated to counts per individual Thiessen polygon.

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[6] Ratcliffe (2004) found that an 85% hit rate was an acceptable minimum standard when conducting spatial crime analysis, although recent work has returned to this question of minimum acceptable hit rates. Briz-Redón et al. (2020) replicated (Ratcliffe 2004) procedure using five crime types aggregated to five different areal units in Valencia. They found that

The distribution of OD counts per year from 2015 through 2019 across different race and ethnicity groups is displayed in Table 1. Though accounting for 2.5% of the city's street corners, the target area of focus in this study experienced slightly more than 13% of the city's overdoses between 2015 and 2019. Citywide, overdose deaths increased more than 60% between 2015 and 2019, while the number of ODs in Kensington-Fairhill increased by 50%. Drug overdose victims in Philadelphia are primarily white, though the share of non-white victims appears to have grown, both in the city as a whole and in the target area, during the same time period. Between 2015 and 2019, the share of overdose victims who were non-white grew nearly 80% citywide, and by 375% in Kensington-Fairhill. The share of Hispanic overdose victims grew more than 120% and 91% in the city and Kensington-Fairhill, respectively. Victims who overdosed in Kensington-Fairhill who were from Philadelphia and for whom a home address was known came from many different parts of the city, including neighborhoods in and around the target area, and far north and south of the city. While we do not know the individual socioeconomic status of the OD victims who make up our sample, we found by analyzing the census tracts of their home address that most, but not all, of the decedents hailed from neighborhoods with high levels of concentrated disadvantage[7]. In 2019 alone, most of the victims in the target area for whom a Philadelphia address was known lived in tracts more than 1 standard deviation above the city average in concentrated disadvantage, with some home tracts as high as nearly 2.5 standard deviations above the average.

Table 1. Number of ODs in the Target Area and Citywide, by Year.

Year	2015		2016		2017		2018		2019		Total	
Demographics of OD Victims	N	%	N	%	N	%	N	%	N	%	N	%
Total Phila. ODs	666	100.0	832	100.0	1139	100.0	1021	100.0	1070	100.0	4728	100.0
Race												
White	445	66.8	565	67.9	817	71.7	682	66.8	677	63.3	3186	67.4
Non-white	220	33.0	267	32.1	321	28.2	339	33.2	393	36.7	1540	32.6
Unknown	1	0.2	0	0.0	1	0.1	0	0.0	0	0.0	2	0.0
Ethnicity												
Hispanic	77	11.6	103	12.4	156	13.7	137	13.4	172	16.1	645	13.6
Non-Hispanic	585	87.8	721	86.7	970	85.2	875	85.7	858	80.2	4009	84.8
Unknown	4	0.6	8	1.0	13	1.1	9	0.9	40	3.7	74	1.6
Target Area ODs *	100	15.0	105	12.6	160	14.0	115	11.3	150	14.0	630	13.3
Race												
White	91	91.0	86	81.9	128	80.0	87	75.7	112	74.7	504	80.0
Non-white	8	8.0	19	18.1	32	20.0	28	24.4	38	25.3	125	19.8
Unknown	1	1.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.2
Ethnicity												
Hispanic	34	34.0	35	33.3	53	33.1	41	35.7	65	43.3	228	36.2
Non-Hispanic	64	64.0	66	62.9	103	64.4	72	62.6	75	50.0	380	60.3
Unknown	2	2.0	4	3.8	4	2.5	2	1.7	10	6.7	22	3.5

Notes. Total number of accidental overdose deaths occurring within Philadelphia between 2015 and 2019 that could be successfully geocoded (i.e., no missing or unknown event address) or those that did not occur at the Philadelphia International Airport, which was excluded from our citywide network of Thiessen polygons. Overdose data from Drug Enforcement Administration. Phila. refers to Philadelphia. OD refers to Overdose deaths. * Percentages in this row reflect the percentage of overdoses out of the total number of overdoses in the city.

Table 2 displays the distribution of ODs by Thiessen polygons in the study area. ODs are a relatively rare occurrence for most Thiessen polygons in the study area. Nearly $\frac{3}{4}$ of Thiessen polygons experienced 0 or 1 ODs between 2015 and 2019.

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the minimum acceptable hit rate varied by the crime type and areal unit under consideration. For all crime types, when considering a spatial extent of 566 Thiessen polygons constructed around street intersections in Valencia, their analyses yielded a minimum acceptable hit rate ranging from 72% to 83.7% (Briz-Redón et al. 2020).

[7] As detailed in the measurements section, concentrated disadvantage is an index comprising the extent of unemployment, poverty, households receiving public assistance, and female-headed households.

Table 2. Number of ODs in Thiessen Polygons in the Study Area, 2015–2019.

N of ODs	N of TPs	%	Cumulative %
0	269	50.47	50.47
1	116	21.76	72.23
2	75	14.07	86.3
3	28	5.25	91.56
4	14	2.63	94.18
5	11	2.06	96.25
6–9	14	2.63	98.87
10+	6	1.13	100
Total	533	100	100

Notes. Overdose data from Drug Enforcement Administration. OD refers to overdose deaths. TP refers to Thiessen polygons.

3.3.2. Independent Variables

The primary predictors of interest included indicators of DTO or drug corner status. A dichotomous variable was created indicating whether the street corner was designated a Kensington-Fairhill "priority corner." Priority corners were determined in mid-2018 by a law enforcement working group that was comprised of representatives from state, local and federal law enforcement agencies as those that should be prioritized for collaborative long-term investigation efforts. Violent crime and drug seizure data and street-level knowledge were used to define this list of corners based on each corner's volume of drug sales and level of violence (Roselli 2018).

In addition to the measure of priority corner status, a variable was also included to capture the proximity of each street corner unit to priority corners. This variable was calculated from the straight-line Euclidean distance between the centroid of each Thiessen polygon (the street corner) and all priority corners. Each separate distance was then summed to represent the total distance in miles between each Thiessen polygon and the priority corners. Lower values on this variable indicate a street corner unit is closer to priority corners, whereas high values indicate the opposite. Some studies have used a minimum distance measure between the centroid of a spatial unit and key places such as hospitals or fire departments in predicting overdose deaths, e.g., (Li et al. 2019). Similarly, studies examining the spatial exposure of risky facilities on spatial units have used inverse distance calculations that weight places that are closer more and vice versa for those that are further away, e.g., (Trangenstein et al. 2018). Rather than use an inverse distance calculation, which would differentially weight gang corners based on their distance (Ratcliffe and Taniguchi 2008), we sum all distances using equal weights, as we sought to capture the potential influence of all priority DTOs in the target area on ODs as a measure of the agglomeration economy of drug markets. We also wanted to be inclusive of all priority corners in the target area, as we anticipated a higher density of drug purchasing opportunity would likely coincide with higher numbers of overdose deaths.

3.3.3. Additional Covariates

In addition to the priority corner indicators, we included a series of social and structural covariates that we expected to have a theoretical relationship with the location of ODs. The typical contextual factors related to social disorganization theory are the structural constraints that give rise to low social control and cohesion (e.g., economic disadvantage, residential instability, foreign-born population). Factors related to small-area places are informed by the routine activities perspective—those factors that tend to attract and/or generate crime acting as places where motivated offenders come together with potential targets and lack of capable guardians. These covariates are listed in turn below.

The sociodemographic context of the Thiessen polygons was measured by four variables constructed from the 2014–2018 American Community Survey (ACS). We included the percent of the population who were male, as prior research has linked this measure positively with heroin-related emergency services calls (Li et al. 2019). We also included three variables capturing the social

disorganization of the street corners (Shaw and McKay 1942). These include an additive index capturing the concentrated disadvantage of the corner. This variable was comprised of the sum of the z scores for the percent of the population who are unemployed, below the poverty line, living in female-headed households, and the percentage of households receiving public assistance divided by 4. Residential instability is also measured as an index, comprised of the sum of the z scores of the percent of renter-occupied housing units and percentage of households moving in after 2014 divided by 2. To capture population heterogeneity, we created a proxy measure for foreign born, operationalized as the percentage of the population who spoke a language at home other than English.[8]

In addition to the social context of street corner units, we include a series of measures related to the environmental context of each unit, as prior research points to the importance of certain environmental covariates in overdose deaths (Hembree et al. 2005; Li et al. 2019). Environmental features of street corner units included the presence of commercial or recreational establishments (Li et al. 2019; Hsu and Miller 2017), proximity of a street corner unit to a park (Groff and McCord 2012; Hsu and Miller 2017; Li et al. 2019), as well as the number of street trees (Wheeler 2018) and presence of bridges as measures of visibility. Commercial land-use data at the parcel level were obtained via the City's open data portal. The land-use data were available as a polygon shapefile that was imported into ArcGIS Pro and overlaid with the Thiessen polygon network to calculate the percentage of commercial or recreational establishments in each street corner unit. Park locations were also obtained via the City's data portal as a polygon shapefile that was overlaid with the Thiessen polygon network. If a Thiessen polygon touched a park, it was given a value of one for the park variable, and a zero if it did not. The number of street trees and presence of bridges were obtained as geocoded point data from the same open data portal. The street trees were measured as part of a 2016 street tree inventory, where each data point represents a tree. The number of trees was summed for each Thiessen polygon. Considering bridge presence, a Thiessen polygon was said to contain a bridge if it contained a bridge point after overlaying the point dataset with the Thiessen polygon network. We expected the measure of whether the Thiessen polygon contained a bridge would be particularly relevant to ODs, since Kensington has a recent history with homeless encampments situated beneath bridges and overpasses (Metraux et al. 2019). Many of the inhabitants of these encampments are opioid users.

Regarding drug markets more generally, past research and the routine activities perspective would suggest that environmental features that maximize retail accessibility and security confer more success to drug dealing, or otherwise play into dealers' decisions on where to do business (Eck 1995; St. Jean 2007; Barnum et al. 2017; Bernasco and Jacques 2015). For instance, Valasik (2018) used Risk Terrain Modelling (RTM) of 22 different environmental risk factors to predict gang assault and homicide. He found that proximity to a Metro rail stop was one of the strongest predictors of gang assault. In part, he notes this may be due to the routine activities of gang members themselves, who, along with other community residents, often congregated around transit stops awaiting travel into the city. Measures intending to capture the accessibility of street corners were thus included in this study, as we hypothesized that corners conducive both to higher flows of people and drug sales would be associated with more ODs. One measure included a dichotomous indicator of whether the Thiessen polygon contained any transit stops (bus, train, trolley, or subway). Data on transit stop locations were obtained via the Southeastern Pennsylvania Transit Authority's (SEPTA) open data portal[9]. The number of street segments intersecting with each Thiessen polygon was also included. This variable was constructed by overlaying a Philadelphia streets file with the Thiessen polygon layer in ArcGIS Pro, and capturing the number of street segments that intersected with each polygon. Whether Thiessen polygons contained any streets designated as "No-thru trucks streets" was included as another measure of accessibility, given these would be smaller, local streets more conducive to pedestrian flow. Both street measures were sourced from the city of Philadelphia's open data web portal.

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[8] This American Community Survey item was not available at the Census block group level.
[9] http://septaopendata-septa.opendata.arcgis.com/.

Finally, we use 311 calls for service occurring between 1 January 2018 and 31 December 2019 as measures of physical incivilities and informal social control. We obtained geocoded data on five categories of quality of life calls from the Philly 311 department. These data are also available via the City's open data web portal[10]. The categories of calls included graffiti removal, streetlight outages, vacant house calls, vacant lot cleanups, and calls regarding abandoned vehicles.

3.4. Allocation of Census Data to Thiessen Polygons

Thiessen polygons require an additional step compared to more traditional census geographies when aggregating census data to each unit. Thiessen polygons may fall within multiple census units, such as census block groups (CBGs). A simple method of assignment would be to assign each Thiessen polygon the census attributes of the CBG that its centroid fell within. However, in this research, we follow Taniguchi, Ratcliffe, and Taylor (2011) in proportionally allocating census attributes to Thiessen polygons. This method calculates the proportion of area in CBGs that make up each Thiessen polygon, and uses this proportion to allocate the count data to each Thiessen polygon. For instance, if 25% of CBG 100 and 50% of CBG 101 fall within Thiessen polygon A, the weighted population for Thiessen polygon A would be calculated as:

$$\text{Pop}_{TPA} = 0.25 * \text{Pop}_{CBG100} + 0.50 * \text{Pop}_{CBG101} \tag{1}$$

All census attributes were proportionally allocated to Thiessen polygons using this method. Census measures used in the analyses, including the percentage male, speaking a foreign language at home, concentrated disadvantage and residential instability indices, were calculated from these weighted counts. Table 3 presents descriptive statistics of all measures included in the analyses.[11]

Table 3. Descriptive Statistics.

Variable	Mean	SD	Min	Max	Skew	N
Accidental overdose deaths, 2018–2019	0.5	0.9	0	6	2.47	533
Priority corner	0.03	0.18	0	1	5.16	533
Proximity to all priority corners	13.53	2.68	9.77	22.18	0.74	533
Concentrated disadvantage	0.84	0.52	−0.55	2.97	0.42	533
Residential stability	0.17	0.67	−1.87	2.02	0.24	533
Foreign language at home	1	0.5	−0.15	4.74	2.05	533
Transit stops	0.13	0.34	0	1	2.16	533
No truck street	0.26	0.44	0	1	1.07	533
Number of street segments	3.83	0.61	2	6	0.21	533
Number of trees	2.62	3.76	0	33	2.9	533
Presence of a park	0.1	0.3	0	1	2.68	533
Presence of a bridge	0.08	0.28	0	1	2.99	533
Calls for abandoned vehicles	2.65	3.47	0	27	2.71	533
Calls for graffiti	4.92	9.28	0	87	4.62	533
Calls for broken street light	0.87	1.35	0	9	2.48	533
Calls for vacant houses	1.73	3.31	0	27	3.23	533
Calls for vacant lot	1.5	2.93	0	24	3.71	533
Male	49.05	6.78	27.93	82.52	0.04	533
Area (square ft)	73,478.49	34,305.69	20,439.41	312,922.9	2.37	533

Notes. SD refers to standard deviation, square ft refers to square feet.

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[10] https://www.opendataphilly.org/.

[11] The land use variable measuring the percent commercial or recreational land use was dropped from all analyses due to its correlation with transit stops, impeding model convergence. We retained the transit stops variable as we expected it would vary across the spatial units in our study more than the land use variable, particularly due to the very small size of the units.

3.5. Spatial Concentration of ODs

Before multivariate analyses were conducted, we used a novel metric, the Rare Event Concentration Coefficient (RECC), to determine the concentration of accidental ODs throughout the study area between 2015 and 2019 (Curiel and Bishop 2016; Curiel et al. 2018). We examined the RECC annually to provide insight into the stability (or instability) of the concentration of ODs over time, which in turn, guided which years of data were aggregated for the predictive analyses. The RECC was conceived as a concentration metric designed for rare events (e.g., crime, volcano eruptions, and traffic accidents) that typically follow a Poisson-type process. The rarity at which ODs occurred in the target area necessitated this approach as most street corner units experienced 0 ODs across the five years of this study. Because whether a place experiences 0 events in a year does not mean its probability of experiencing crime is equal to 0 (Curiel et al. 2018), it is more desirable to consider observed counts as realizations of an underlying Poisson process, rather than focus on the counts themselves (Curiel and Bishop 2016).

The calculation of the RECC proceeded in two main steps. The first was to create a distribution of expected rates at which ODs occur. This was accomplished by estimating a mixture model of the observed counts of ODs for all Thiessen polygons. We used the CAMAN package in R[12] for this analysis. This process identified groups of Thiessen polygons with the same rate of OD occurrence in each year. A vector of the rates was then created, where the frequency at which each rate appeared in the vector was proportional to the number of Thiessen polygons that fell into its respective group. The second step in the calculation was to apply the formula for the Gini coefficient to the vector of expected rates, which produced the RECC. The RECC takes on a value between 0 and 1, and is interpreted in the same manner as the Gini coefficient, with values closer to 0 denoting more equality (or more dispersion), and values closer to 1 indicating more concentration. We repeated this analysis for ODs in Thiessen polygons for each year between 2015 and 2019. The resulting values are in Table 4. The RECC dropped by nearly 20% between 2015 and 2019, reflecting that ODs are more dispersed—that is, they are more evenly experienced by street corner units in Kensington—in the latter part of the time period.

Table 4. Rare Event Concentration Coefficient (RECC) for Overdose Deaths in the Target Area, 2015–2019.

Year	RECC—Rates	RECC—Raw
2015	0.71	0.711
2016	0.615	0.618
2017	0.649	0.651
2018	0.451	0.453
2019	0.568	0.571

Notes. RECC refers to Rare Event Concentration Coefficient. Values in the "RECC—Rates" column were calculated using the natural log of the area of the Thiessen polygons as an offset in the mixture model. The "RECC—Raw" column does not use an offset in the mixture model; the estimated group rates are estimated counts per year.

3.6. Analytic Approach Predicting Counts of ODs in Thiessen Polygons

The RECC analyses revealed a shift in the spatial dispersion of ODs in 2018 and 2019, suggesting ODs are less concentrated in more recent years. We therefore focused our multivariate analyses predicting counts of ODs in street corner units on those overdose deaths occurring in 2018 and 2019. A global Moran's *I* test of the 2018 and 2019 ODs also revealed significant positive spatial autocorrelation among the target area Thiessen polygons (Moran's $I = 0.24$, pseudo-$p < 0.001$) (Anselin 1996). This motivated our use of a spatial econometric method using an information theoretic approach to estimating ODs in Thiessen polygons. Specifically, we employed a series of generalized cross-entropy (GCE) models, which are well suited for examining rare count outcomes with a correlated

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[12] https://cran.r-project.org/web/packages/CAMAN/CAMAN.pdf.

spatial structure. GCE models are also adept at handling both over- and underdispersion and have been demonstrated as more suitable (compared to negative binomial regression) to estimating spatially autocorrelated and overdispersed count outcomes through simulations (Bhati 2008). The GCE modeling approach has been used in previous place-based crime studies, including those examining homicides in Chicago (Bhati 2008) and the effect of alcohol outlets on violence and disorder in Washington, DC (Roman et al. 2008; Roman and Reid 2012). It is important to note that earlier studies comparing GCE model outcomes to outcomes from the more typical negative binomial regression models incorporating a spatial lag variable reveal the superiority of the GCE models for handling the spatial structure of the data (Roman et al. 2008). We used a GCE macro written for the SAS platform to execute all regression models (see Roman et al. 2008).

The general model building strategy we follow was nested according to different theoretical blocks of interest. The first model predicted the number of ODs including only the key gang variables, controlling for the percentage of the population who are male. The second model incorporated the variables measuring the social structural features of the street corners, including measures of social disorganization. Model three examined the effect of certain environmental features of street corners on drug overdoses. Finally, model four explored the effect of the priority corner status on ODs, while simultaneously considering the social and environmental features of the street corners. For each model considered, the natural log of the area of each Thiessen polygon in feet was used as the offset variable.

4. Results

The GCE regression results from all four models are detailed in Table 5. Unlike OLS regression models, the coefficients yielded from the GCE models do not allow for a direct substantive interpretation (Bhati 2008). However, marginal effects can be calculated from the GCE coefficients, which can be interpreted as the change in the expected rate of ODs per square foot given a one-unit change in the predictor. In order to save space, the marginal effects are not shown in Table 5, but they are noted in the text and available from the lead author upon request. In Model 1, both the gang corner status and the proximity to gang measure were significantly related to the rate of OD incidents in each street corner, controlling for the percentage male population. The priority corner status was positively related to ODs, indicating that corners that were prioritized for drug gang enforcement efforts were associated with higher rates of ODs than those that were not. The variable capturing each corner's proximity to all gangs was negatively related to ODs, meaning that the less distance between a street corner and all gang corners in the target area, the higher the OD rate that corner is expected to have. However, the pseudo-R^2 for this model was −0.09, indicating a very poor fit to the data. Model 2 incorporated three measures of social disorganization of the street corners. The gang status of the corner remained a positive and significant indicator of ODs, however the measure capturing the proximity to all gang corners was no longer significant once considering the social disorganization of the corners. Consistent with expectations, both concentrated disadvantage and residential instability were significantly, and positively related to the rate of ODs. Yet, the measure of foreign language at home was significantly and negatively related to overdoses. The Model 2 pseudo-R^2 was 0.04, indicating Model 2 was also a poor fit.

Model 3 incorporated aspects of the physical environment of the corners into the model, resulting in an improved model pseudo-R^2 of 0.12. Both priority corner predictors dropped out as significant predictors of ODs when simultaneously controlling for social disorganization and certain environmental characteristics of the corners. The coefficients for all three social disorganization factors remained largely unchanged from Model 2, yet there were only two environmental characteristics—transit stops and the number of street segments—that were significantly associated with ODs.

Table 5. GCE Model Results.

Predicting Overdose Deaths	Model 1		Model 2		Model 3		Model 4	
Variable	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Constant	4.103 ***	0.743	3.126 **	1.123	−0.279	0.344	−13.625 ***	2.815
Drug Trafficking Organizations/Gangs								
Priority corner	0.406 *	0.184	0.446 **	0.183	0.215	0.214	0.479 *	0.233
Proximity to all priority corners	−0.042 ***	0.011	−0.020	0.013	−0.031	0.019	−0.092 ***	0.03
Social Disorganization								
Concentrated disadvantage	-	-	0.254 ***	0.082	0.246 ***	0.085	0.397 ***	0.132
Residential stability	-	-	0.155 *	0.064	0.158 *	0.07	0.108	0.099
Foreign language at home	-	-	−0.448 ***	0.094	−0.393 ***	0.103	−0.463 ***	0.143
Physical Environment								
Transit stops	-	-	-	-	0.396 ***	0.114	0.624 ***	0.156
No truck street	-	-	-	-	0.009	0.118	0.038	0.145
Number of street segments	-	-	-	-	0.257 ***	0.078	0.190 *	0.096
Number of trees	-	-	-	-	−0.029	0.017	0.015	0.02
Presence of a park	-	-	-	-	−0.187	0.203	−0.590 **	0.239
Presence of a bridge	-	-	-	-	0.189	0.142	0.457 **	0.182
Informal Social Control/Incivilities								
Calls for abandoned vehicles	-	-	-	-	-	-	−0.047 *	0.023
Calls for graffiti	-	-	-	-	-	-	−0.005	0.007
Calls for broken street light	-	-	-	-	-	-	−0.056	0.044
Calls for vacant houses	-	-	-	-	-	-	0.055 ***	0.015
Calls for vacant lot	-	-	-	-	-	-	0.042 **	0.016
Control								
Male	−0.013 *	0.007	−0.003	0.007	−0.003	0.002	0.011	0.01
Pseudo R2	−0.09		0.04		0.12		0.22	
Rho	1.23 ***		1.20 ***		1.00 ***		−0.08	
Overdispersion parameter	0.80 ***		0.81 ***		0.75 ***		0.57 ***	

Notes. GCE refers to Generalized Cross Entropy. Coeff. refers to coefficient, S.E. refers to standard error. * $p <= 0.05$; ** $p <= 0.01$; *** $p <= 0.001$.

The full model (Model 4) included both priority corner variables, and social and environmental features of the street corners in predicting rates of ODs. The pseudo-R^2 for the main model increased to 0.22, signifying an improvement in model fit. Taking into account the features of the social and built environment, the variable capturing priority corner status significantly predicted overdose deaths, in that street corners that are designated drug trafficking corners were associated with 0.42 more expected overdoses per square foot. Similarly, the measure that captures the proximity to all priority corners was significant and negative, meaning the closer a street corner is to all drug trafficking corners, the higher the expected rate of ODs is in that corner, net of all other covariates. Stated differently, each one-mile increase in the distance to all priority corners was associated with an expected 0.08 fewer ODs per square foot.

With regard to the social disorganization factors, the final model revealed a significant relationship between concentrated disadvantage and ODs (marginal effect = 0.34) and the percent speaking a foreign language at home and ODs (marginal effect = −0.40). Additional contextual influences include the positive and significant effects of transit stops and number of intersecting street segments, measures intending to capture the accessibility of the street corner, on overdose deaths. Consistent with our expectation, the results suggest street corners that generate more pedestrian flow were more likely to have a higher expected rate of overdose deaths (transit stops: marginal effect = 0.54, number of street segments: marginal effect = 0.16). Whether a street corner had a transit stop in particular was associated with an expected increase of 0.54 ODs per square foot. However, the flag for whether a street corner unit touched a park was significant and negatively related to overdose deaths (marginal effect = −0.51). Finally, measures capturing the informal social control and incivilities of the area, calls for vacant houses and for vacant lots, were significantly and positively associated with overdose deaths (marginal effects = 0.05, 0.04, respectively). Calls for abandoned vehicles were also significantly associated with more ODs, yet in the opposite direction (marginal effect = −0.04). Importantly, Rho, the coefficient representing the spatial autocorrelation, was significant and positive for Models 1–3, yet the full model had a non-significant Rho.

5. Limitations

Before we discuss the findings, there are several limitations to this study that require mention. The statistical analyses we employed are inherently cross-sectional, and hence, our findings can only comment on the correlational relationship between our predictors of interest and overdose deaths. Future work could employ longitudinal methods to establish a causal link between presence of gang-controlled drug corners and overdose deaths that might result. Second, our indicator for whether a Thiessen polygon contained a priority drug trafficking corner status is not inclusive of *all* gang-related corners in the target area (or even all *drug-selling* gang corners), though it captures the most violent and/or high-volume drug trafficking corners as of 2018. Third, our data preclude our ability to know whether or not ODs are affiliated with a given drug trafficking corner. The target area is relatively small, with some drug-selling gang corners in relatively close proximity. If individuals use drugs nearby after they purchase them, it is possible that they OD in another gang's drug sales territory. Finally, although the RECC analyses showed that the dispersion of overdose deaths changed over time, we did not run analyses that might have given us clues as to why the concentration changed over time. We could hypothesize that these changes had to do with macro-level forces such as the steep increase in sales of fentanyl that occurred throughout the US (and Philadelphia) temporally around late 2016 and 2017, or the closing of a large outdoor homeless encampment supporting users of heroin around the same time, but we do not have the appropriate data to validly model these changes. These limitations notwithstanding, this study helps shed light on the connection between drug trafficking gangs and the spatial location of accidental overdose deaths.

6. Discussion and Conclusions

Using multiple methods, this work sought to answer whether deaths from accidental drug overdose are located in close proximity to gang-controlled street corners in an area of a city known for its agglomeration economy drug markets and provide insight into which features of places are associated with the location of overdose deaths using theory as a guide. Findings from RECC analyses indicated that patterns of overdose mortality clustering changed over time, providing guidance that predictive analyses should focus only on a two-year period where the spatial patterns were similar, as opposed to a longer time period. As stated in the "limitations section", OD dispersion could potentially be attributed to different factors changing the routine activities of drug users in the neighborhood attributed to changes in access to public spaces such as the 2017 cleanup of a large, open-air heroin camp at the Conrail train tracks in Kensington (Wolfram 2017)—potentially displacing many homeless heroin users. It could be that this displacement shifted many users' routine activities and in consequence shifted the distribution of ODs across Kensington. It may also suggest that risky environments move around and change with the habits of individuals. A state level policy change may also have influenced the dispersal of overdose deaths in Kensington during the time period examined. The governor of Pennsylvania issued a standing order in 2015 allowing for all citizens—not just emergency services personnel—to obtain the overdose-reversal medication Naloxone (Schwartz et al. 2020). This change allows for more people, including drug users and sellers, to carry and administer the medication (Feldman 2020).

The GCE models revealed that street corners controlled by drug trafficking gangs or those that are situated centrally for easy access to multiple drug corners were associated with more ODs, echoing previous work finding a significant positive influence of gang member density at the block level and the presence of a drug house at the parcel level on overdose deaths (Headley Konkel and Hoffman 2020). The results also suggest drug market dynamics where buyers use drugs right away or close to purchase, consistent with anecdotal evidence from law enforcement. Unsurprisingly, street corners that were designated as priority corners showed clear evidence of being affiliated with a higher rate of ODs. Further, indeed, additional analyses (not shown) revealed that the average number of ODs in Thiessen polygons designated as priority corners was double that of non-gang corners[13]. A key implication to also note from these findings is that the actual location and status of individual drug corners are not the only measures predicting higher counts of overdose deaths. The agglomeration economy of the Kensington-Fairhill drug market appears to contribute to its overall retail success, but also its experience with overdose deaths. The significance of the variable capturing the proximity to gang-controlled drug corners leads us to believe that even corners that are not gang-controlled may experience more ODs because of where they are relatively located in space. There were 54 Thiessen polygons in the top 90th percentile in proximity to drug corners, yet the average count of ODs for this group was 8% higher than for the target area polygons as a whole. Geographically, these polygons were clustered in the lower middle of the target area, several blocks from the Kensington Avenue corridor. Our analyses reveal that it is important to capture not only the DTO status of corners in predicting the spatial location of ODs, but also where each street corner is situated within the wider network of open-air drug market corners.

We also found support for social disorganization theory with regard to the relevance of certain macro structural constraints in predicting overdose deaths. Our findings revealed a significant effect of concentrated disadvantage on ODs, which is somewhat inconsistent with previous work. For instance, Martinez et al. (2008) and Li et al. (2019) both included structural deprivation measures in their models predicting overdoses, yet the effects were non-significant. The differences in findings here could relate

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[13] There were 18 Thiessen polygons designated as priority corners, experiencing 19 ODs in 2018–2019. This resulted in a mean of 1.06 ODs per Thiessen polygon. There were 515 Thiessen polygons that were not designated as priority corners, experiencing 246 ODs in 2018-2019, with a mean of 0.48 ODs per Thiessen polygon.

to the different unit of analyses used or that there are regional differences (across the US) with regard to how social disorganization influences drug misuse/overdose mortality. The negative effect of our measure to capture foreign born—the percent speaking a foreign language at home—on ODs in our model, however, echoes the (Martinez et al. 2008) finding that racial heterogeneity had a negative relationship with drug overdoses. While it is impossible to know the precise mechanism responsible for this relationship, it could be that our measure of foreign born reflects a type of protective factor that has been associated with concentrations of immigrants and crime (Ousey and Kubrin 2018). For our study, the Census-based measures represent the residents living in homes in the street corner areas, not the characteristics of the overdose victims. Similar to Johnson and Shreve (2020), we are unable to account for individual characteristics of the decedents due to the aggregate nature of our analyses and idiosyncrasies of the data used here. Specifically, while the data often contained the home address of decedents (some were labeled missing, unknown, or homeless), there may be some question as to the reliability of this indicator in practice, particularly given the transience of much of the drug using population in Kensington. This fact notwithstanding, we found that 34% of the fatal OD victims in the target area for the period 2018–2019 were described as dying at their residence.[14] From this we can cautiously surmise that in at least 1/3 of the OD cases in the study area, for the social disorganization measures, the corner attributes partially reflect the macro-level structural characteristics related to the decedents' themselves. This makeup agrees with recent qualitative work in Kensington that finds most drug users in the neighborhood are coming in from other places (Friedman et al. 2019). Future research could not only explore how the individual-level characteristics of those misusing drugs in micro-places interact with characteristics of residents in those neighborhoods, but also the dynamics of drug use and overdose among different populations—residents from inside and outside of the neighborhood and the homeless population—in and around this drug market.

We also found that the accessibility of the street corners themselves translated to more ODs. This is contrary to Li et al. (2019) finding that public transportation (measured as bus coverage) was not significantly related to overdose deaths. The significant negative relationship between street corners that touched a park and overdose deaths was also contradictory to Li et al. (2019) findings of a positive relationship between these two constructs, though their measure of park presence differed from ours in that it captured the proportion of park area in each census block group. For the measures capturing the informal social control and incivilities of the area, two call types, those for vacant houses and those for vacant lots, were significantly and positively associated with overdose deaths, while calls for abandoned vehicles were significantly and negatively associated with ODs. We are unaware of previous work examining these specific call types on overdose deaths, but research examining the degradation of the built environment has found mixed results with regard to its effects on overdose deaths. For example, (Hembree et al. 2005) found that the percentage of acceptably clean streets in New York City was a negative predictor of drug overdose deaths, while (Cerdá et al. 2013), also looking at New York City, found that acceptably clean sidewalks were only a significant predictor when comparing analgesic-related ODs with heroin-related ODs, but not compared with non-overdose accidental deaths. Furthermore, the authors found that dilapidated housing was not a significant predictor for analgesic-related ODs for either comparison. In the context of our results, more calls regarding vacant houses or lots could be related to the actual presence of such vacant lots and houses; spaces that may be attractive for illicit drug use.

Ultimately, the results from our GCE models and RECC analyses have multiple implications for policy related to community overdose mortality and gangs actively involved in selling heroin. Our findings suggest programs seeking to address ODs should be mobile and targeted specifically to risky places to enhance service reach. The emphasis here is on micro-places—prevention efforts can be

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14   i.e., the death location was noted as "residence", and the decedents' home address, event address, and death address were all the same.

pinpointed with precise targeting—down to blocks and corners. Mobile outreach initiatives, such as those providing clean syringe exchange or treatment, and other flexible strategies would be a relevant approach to reducing ODs, capable of adapting with the routine activities of users. Particularly in the context of Kensington, where most users are not residents of the neighborhood (Friedman et al. 2019) and therefore may not maintain a static presence or activity space (Brantingham and Brantingham 1995). The effect of priority corner proximity, as well as of accessibility of street corners on ODs, bolsters this idea that locating social service provision and outreach central to drug markets and high traffic locations may prove beneficial.

The co-location of ODs and drug trafficking corners also alludes to the utility of coordinating law enforcement and social services to address both challenges. It has long been acknowledged that "focused, partnership-type law enforcement interventions are generally far more effective responses to ongoing crime problems than are unfocused efforts relying entirely on law enforcement resources" (Mazerolle et al. 2007, p. 116). Coordinated interventions have the potential to disrupt the harm caused by gang members through large-scale drug distribution and gun violence, while attempting to reverse some of the physical and social incivilities brought on certain neighborhood corners that affect residents' quality of life. Indeed, in their systematic review of drug law enforcement, (Mazerolle et al. 2007) found that proactive strategies involving partnerships between law enforcement and third parties or community agencies were the most effective at reducing drug and other crime, as well as increasing community residents' reported quality of life (Mazerolle et al. 2007).

In some jurisdictions, the scale of the current opioid epidemic appears to be facilitating a shift towards increased collaboration between federal, state, and local law enforcement agencies and their public health and social service counterparts to reduce the harm affiliated with drug markets and gangs (Police Executive Research Forum 2016). Collaborative partnerships that include permanent supportive housing would be especially salient for neighborhoods such as Kensington with a recent history of homeless and heroin encampments. So too would strategies that incorporate elimination of or reduction in housing blight. In severely disadvantaged areas such as Kensington-Fairhill, collaborative strategies could benefit from careful, data-driven targeting of micro-locations for clean-up and housing investment following (or simultaneous to) law enforcement strategies for arrest and prosecution. In short, a multipronged strategy of combating drug trafficking organizations while alleviating some of the social and environmental obstacles faced by some areas may go a long way in lessening the impact of individual drug corners and the larger market on overdose deaths. While the current research focused on a single phenomenon, accidental overdose deaths, the scope of the harm brought by drug trafficking organizations on the communities in which they operate is difficult to overstate. Researchers and practitioners should continue to use data to better inform how drug trafficking organizations shape public safety and public health in communities, and in turn, inform innovative solutions to address both.

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