

The Social Architecture of Homicide in British Columbia

Evan McCuish, PhD and Martin Bouchard, PhD

**School of Criminology
Simon Fraser University**



Ministry of
Public Safety and
Solicitor General



Royal Canadian
Mounted Police

Gendarmerie royale
du Canada



SIMON FRASER
UNIVERSITY

Table of Contents

The Crime Reduction Research Program.....	1
Executive Summary.....	2
Acronyms and Glossary of Key Terms	3
Introduction	5
Structure of the Report.....	6
Report Aims.....	6
Section I: What is Known about Homicide Offenders?	7
First Generation Studies	7
Second Generation Studies	7
Third Generation Studies	8
Proposal for a Fourth Generation	9
Section II: Social Network Analysis	10
The Fundamentals of Social Network Analysis.....	11
Social Networks and Homicide	12
Section III: Method.....	13
Sample	13
Procedures	15
Network Measures	15
Analytic Strategy.....	16
Section IV: Comparing Homicide and Non-Homicide Offenders.....	17
Explaining Differences in Network Structure: Does Homicide Matter?	23
Section V: Pre- Versus Post-Homicide Networks.....	25
Did Ego Networks Change Following Homicide Offending?	31
Section VI: A Brief Look into the Nature of Gang Involvement in Homicide Events	33
Section VII: Conclusion	35
Policy Implications.....	36
References.....	39

List of Tables

Table 1. Characteristics of Homicide Offenders and Non-Homicide Offenders.	14
---	----

List of Figures

Figure 1. Hypothetical Co-offending Network of a Street Gang.	11
Figure 2. Full Network.	17
Figure 3. Prison (Panel A) and Community (Panel B) Network Structures.	19
Figure 4. Social (Panel A), Co-Offending (Panel B), and Conflict (Panel C) Network Structures.	20
Figure 5. Comparison of Degree (Panel A) and Betweenness (Panel B) Centrality across Homicide and Non-Homicide Offenders.	22
Figure 6. Trajectories of Degree Centrality for Homicide Offenders and Non-Homicide Offenders.	24
Figure 7. Comparing Degree Centrality Before Versus after the Average Age of Homicide Offending.	25
Figure 8. Homicide Offender Networks before (left) Versus after (right) their Homicide offense.	26
Figure 9. Prison (Panel A) and Community (Panel B) Network Structures before (Left) Versus after (Right) Homicide Involvement.	28
Figure 10. Social (Panel A), Co-Offending (Panel B), and Conflict (Panel C) Network Structure before Versus after Homicide Involvement.	30
Figure 11. Degree Centrality before Versus after Homicide Involvement.	31
Figure 12. Prison and Community Criminogenic Social Network Structures of Homicide Offenders.	32
Figure 13. Full Network with Homicide Events Highlighted by Red Edges.	33
Figure 14. Network of Homicide Events. Homicide Events Highlighted by Red Edges, Green are Co-Offending or Positive Social Ties.	35

The Crime Reduction Research Program

This project was funded through the British Columbia Crime Reduction Research Program (CRRP).

The CRRP is a research grant program administered and funded by the Province of British Columbia in collaboration with the Royal Canadian Mounted Police (RCMP). The CRRP is focused on investing in independent research to inform priority policing operations, policies, and programs related to public safety in British Columbia. In doing so, the CRRP also aims to foster greater collaboration between government, law enforcement, and academic experts in the field of policing and public safety.

Eligible research topics are identified on an annual basis by the BC Ministry of Public Safety & Solicitor General and the RCMP based on current and emerging provincial priorities. All grants are awarded on a merit basis by the CRRP Working Group.

Disclaimer

The statements, findings, and recommendations contained in this report have been reached independently by the authors of this report and do not necessarily reflect the views of the Province of British Columbia.

Executive Summary

Overview

Homicide represents a major threat to public safety in British Columbia. Homicide offenses also influence fear of crime and citizens' concerns about the functioning of the justice system.

Problem Area

Researchers have been relatively silent about what to do about homicide offenses. Access to homicide offenders is challenging given the relative rarity of such offenses, especially in Canada. Often, homicide research focus on atypical homicides (e.g., sexual homicide) and how crime scene evidence profiles help detect suspects. However, this line of research does not help with proactively identifying the risk for homicide in ways that can prevent crimes before they happen. In other words, research has primarily focused on how to identify homicide suspects as opposed to how to prevent homicides. Limited research examining risk for homicide offending has revealed very few differences between homicide offenders and other violent offenders.

Solution

British Columbia is associated with a unique demographic profile that requires investigations of homicide risk factors be "home grown". Given recent evidence that Lower Mainland gang conflict is responsible for several recent homicides, we investigated the criminogenic networks of homicide offenders compared to non-homicide offenders. Ultimately, is who a person associates with informative of their likelihood of involvement in a homicide offense?

Key Findings

Homicide offenders have larger criminogenic networks than non-homicide offenders, and this is true both before and after the timing of the homicide. There is not much difference in the size of homicide offenders' criminogenic networks prior to versus after their involvement in a homicide. However, it does appear that involvement in a homicide offense is associated with a larger network of criminal associates from prison. Finally, a look into the networks of homicide events revealed a sparse set of mostly unrelated events. Gang members play a larger role than others as drivers of homicides in general, but most of the larger homicide events did not involve gangs. **Overall, monitoring direct and indirect (i.e., via other peers) ties to conflict is important for understanding how homicide offenses emerge and how involvement in a homicide offense shapes a person's criminogenic network, especially in prison.**

Acronyms and Glossary of Key Terms

Alter: An actor who is part of the ego network of the person under investigation. The alter shares a direct tie with the ego/seed.

BC: British Columbia

Betweenness Centrality: Referred to colloquially as bridge centrality, refers to the number of times an actor falls along the shortest path length between two otherwise unconnected actors.

CCC: Criminal Code of Canada

CORNET: Corrections Network

Criminal Career: Describes a person's pattern of offending from first to last offense. Is different from a career criminal or someone whose primary means of income is achieved through crime.

Criminal Social Capital: The criminogenic resources (e.g., access to lucrative crime opportunities) that are gained through social relations.

CSC: Correctional Service of Canada

Closeness Centrality: At the individual-level, it represents the shortest distance a person must travel to reach all actors within their network. Lower levels of closeness centrality imply a shorter distance/greater level of embeddedness within a network.

Criminogenic Social Network: A network specifically measuring ties to others involved in criminal behavior. Differs from the broader "social network" that can include friendship, family, and work ties to persons not involved in crime. The analyses in the current report did not include an examination of non-criminal social ties.

Degree Centrality: The number of different network ties of a particular offender.

Density: The proportion of all possible ties within a network that are formed.

Edge: A social tie between two actors in a network.

Ego: The person whose immediate social network is being coded.

Ego Network: The personal network of a specific offender under investigation.

Geodesic Distance: Refers to the average shortest distance a given individual within a network must travel to reach all other actors in the network. Effectively indicates the number of handshakes away the average person is from all other actors within a network. Like closeness centrality but useful for describing the aggregate properties of a network.

Heavying: Prison-based slang referring to the use of bullying or intimidation tactics to influence other inmates or the operations of the jail.

Homicide: Includes the following offenses: first degree murder, second degree murder, attempted murder, manslaughter, criminal negligence causing death, conspiracy to commit murder.

ISVYOS: Incarcerated Serious and Violent Young Offender Study

***M*:** Mean

MCFD: Ministry of Children and Family Development

***n*:** Denotes the sample size.

Network Efficiency: Network efficiency is associated with more success in criminal behavior (e.g., increased earnings; Morselli, 2012). Network efficiency represents the number of alters an individual has, minus the average degree centrality of alters in their network, divided by the number of alters in the ego's network. A perfectly efficient network looks like a star.

Seed: Term used to describe someone whose ego network was coded as part of the examination of a larger network.

***SD*:** Standard Deviation

SNA: Social Network analysis represents a series of theoretical perspectives and analytic strategies designed to directly measure and understand the social context that a person is embedded within.

Structural Holes: When alters within an ego network are unconnected, they have access to different flows of information. Structural holes reflect an opportunity to broker the flow of information between people.

Triadic Closure: Describes the probability that a connection exists between B-C if connections also exist between A-B and A-C.

Introduction

Homicide in British Columbia is a major policy and public safety issue and has led to a series of warnings to members of the public regarding which individuals place other members of the public at-risk of being a victim of a homicide offense (Bains, 2021; Bolan, 2021). The homicide rate in British Columbia, including in Vancouver, has increased over the last few years. The challenge in addressing homicide is exacerbated by the fact that little is known about individual-level risk factors for homicide offending. The high costs associated with homicide offenses (DeLisi et al., 2010) has prompted political leaders and policymakers to support efforts to identify childhood and early adolescent risk factors that help predict which persons will be involved in a homicide offense (DeLisi et al., 2014). However, there is minimal evidence of meaningful distinctions in the developmental risk factor profiles of homicide offenders compared to other offenders involved in violence, which has made it difficult to reliably predict risk for involvement in a homicide offense (DeLisi et al., 2014; Farrington et al., 2012; Loeber & Farrington, 2011). Part of the challenge in learning about homicide is that, relative to other crimes, it occurs at a low frequency. Simply put, homicide offenders are hard to find in samples of offenders and therefore research on this group is limited. Further, when research on homicide offending does occur, it often focuses on crime scene characteristics of highly atypical types of homicide offenses, especially sexual homicide (Beauregard & Proulx, 2007). Accordingly, this research may not generalize to homicide offenses more broadly and is not informative of whether proactive policing and public protection strategies can be taken to prevent homicide offenses before they happen.

The purpose of this research was to investigate the social networks of persons involved in homicide offenses. Are these networks qualitatively or quantitatively different from the criminogenic networks of other persons involved in criminal activity? Can these networks help identify high priority targets that should be, for example, the subject of public duty to warn notifications (Bains, 2021)? Does an offender's involvement in a homicide offense function as a stigmatizing factor, or a status symbol/form of criminal social capital that propels them into being further at the center of criminogenic networks? By looking closely at the networks of homicide offenders, it is possible that patterns will emerge between types of homicide offense committed (e.g., manslaughter versus murder, committed alone versus with a co-offender) and the pattern of a person's social network. It is also possible to investigate whether gang members are associated with larger-scale homicide events that may be especially taxing on police resources. Social network analysis (SNA) is often used to identify 'key players' involved in serious crime (Hashimi & Bouchard, 2017). While SNA is not meant to replace traditional police intervention and enforcement strategies, including strategies for gathering intelligence, the analyses in the current study are meant to inform stakeholders regarding the efficacy of a network approach in understanding the social architecture of homicide offending in BC. Rather than assume that homicides are random, brazen, and unpredictable, can SNA help identify who may be at risk of perpetrating a homicide offense due to having a lifestyle characterized by associating repeatedly with a variety of different offenders?

Structure of the Report

This report includes seven sections. Section I describes what is known (and not known) about homicide offending through the different generations of research conducted so far. This review of the literature highlights the potential efficacy of SNA in addressing unresolved puzzles regarding the origins of homicide offending. Section II describes SNA and why it is a useful tool for preventing homicide offenses. Section III describes the data collection process for examining the criminogenic networks of 79 homicide offenders and a comparison sample of 76 non-homicide offenders incarcerated around the same time as the homicide offender group. Sections IV, V, and VI answer questions regarding the three main report aims listed below and include plain-language summaries of what the findings mean for interpreting the social architecture of homicide offending and the consequences to social networks that result from a person's involvement in a homicide offense. Section VII concludes with policy implications and next steps.

Report Aims

The current study addressed three main research questions:

1. Are the criminogenic social networks of homicide offenders different from other offenders?
 - a. Are homicide offenders more central actors in criminogenic networks compared to non-homicide offenders? What are the specific network characteristics that differ, why might these matter for homicide offending, and do findings vary depending on the location of the network (prison versus community) and type of tie examined (e.g., criminogenic social tie, co-offending tie, conflict tie).
2. Are there differences in network structures before versus after perpetrating a homicide offense?
 - a. Are homicide offenders' networks larger before or after they commit a homicide offense? In other words, is there evidence that a person's network facilitated a homicide offense? Conversely, is there evidence that a person's involvement in homicide facilitated a larger criminogenic network? Are both possible?
3. Are gang members drivers of large homicide events?

Section I: What is Known about Homicide Offenders?

In this section we focus primarily on what we do not know about homicide offenders. Part of the impetus for this section is to establish how SNA helps address limitations of common theoretical and analytic frameworks. This section also helps debunk common myths and misconceptions about homicide offending that are partly responsible for why little is known about homicide offenders. We focus on three major generations of research on homicide.

First Generation Studies

First generation studies emphasized homicide offending as the result of a serious form of psychopathology (e.g., schizophrenia) that was a required characteristic of homicide perpetrators. This first generation of research on homicide principally emerged from clinical-based samples where homicide offenders were referred by the court to specialized clinics and treatment facilities due to a presumption that their homicide offense was caused by psychological impairment. Bender (1959) reported that half of her sample of homicide offenders were previously assessed by psychiatric services. Early research on homicide offenders assumed that attitudes supportive of extreme violence combined with a disregard for the welfare of others was necessary to commit a homicide offense (e.g., Miller & Looney, 1974). Myers et al. (1995) reported on the clinical interviews of 25 homicide offenders and indicated that a mental disorder was present in all but one case, with conduct disorder found in 84% of cases. Rowley et al. (1987) observed that the empirical literature on homicide was plagued by anecdotal reports based on clinical experiences as opposed to systematic studies of this type of offender and lacked comparison samples. The tendency for research to focus on these clinical samples gave researchers and policymakers the impression that psychopathology was a necessary element to homicide offending. Persons needed to be socially isolated, callous, unemotional, and display various interpersonal deficits that would influence their involvement in homicide. In effect, this early stage of research assumed psychological disturbances influenced homicide offending. Rowley et al. (1987) asserted that the prevailing forensic psychology approach to studying homicide offenders insufficiently captured the variability within this group.

Second Generation Studies

Second generation studies recognized that this emphasis on psychological disturbances was a necessary but not sufficient condition for more fully understanding homicide offending. Switching instead to a sociologically-based perspective, macro-level social structure factors tended to receive more attention. The crack cocaine epidemic in the United States was thought to be influencing conflicts in the drug trade responsible for the escalation in violence during this time. A prevailing assumption left over from initial mid-century research on homicide offenders is that such persons are disproportionately more likely to be psychologically disturbed. The 1980s and 1990s brought about a relatively distinct perspective on homicide, one that tended to assume that homicide offenses were

a product of conflict in the drug trade. This perspective identified a broader set of social factors to consider when trying to predict homicide offending. The notion that homicide offenses were strictly a product of a mental disorder was too narrow to account for the range of homicides observed by police in communities. Goldstein's tripartite framework identified how substance use was associated with psychopharmacological effects influencing violence, conflicts between gangs that influenced violence, and conflicts during drug transactions that influenced violence. This perspective influenced broken windows theory and stop and frisk policing strategies (see Nieuwbeerta et al., 2008). Empirical studies supported evidence that neighborhood social cohesion and socioeconomic disadvantage affect an individual's risk of homicide offending. Jones-Webb and Wall (2008) reported that homicide rates were greater in neighborhoods with higher concentrations of Black and Hispanic residents than in other groups, and the association of neighborhood racial/ethnic concentration with homicide was reduced after adjusting for neighborhood social disadvantage variables, especially percent female head of household and percent persons with less than a high school education. Studies also noted that homicides were significantly higher in areas defined by lower levels of education, employment, and income (Dobrin et al., 2005).

Generally speaking, however, most studies tend to focus on how neighborhoods and cities influence broader rates of homicide as opposed to whether an individual is at risk of homicide offending (see Parker & McCall, 1999). These studies neglect the roles that cities and neighborhoods play in the perpetration of homicide by specific individuals. These studies are characterized by ecological fallacy concerns in which aggregate characteristics of neighborhoods cannot be used to explain individual involvement in homicide offenses (Papachristos, 2009). Specifically, while there seems to be evidence that social disadvantage influences homicide, second generation studies of the contextual characteristics of neighborhoods and cities is not informative of which factors influence individual behavior. Third generation studies attempted to address this gap through the investigation of both psychological and sociological risk factors.

Third Generation Studies

Third generation studies used a risk-factor approach that involved an atheoretical approach to studying homicide. Instead, third generation research argued that homicide offenses resulted from the accumulation of various risk factors as opposed to specific risk factors. This recognition of the diversity of persons involved in homicide influenced an innovative approach that emphasized examining a wider range of risk factors for homicide. The risk factor paradigm is a common analytic approach used in criminology to identify which persons are most likely to engage in crime. Broadly speaking, a risk factor increases the likelihood that a negative outcome (e.g., recidivism) occurs. The underlying philosophy of this paradigm is that as risk factors accumulate, the likelihood of offending increases. Thus, if various risk factors can be identified within the same individual, policymakers, practitioners, law enforcement, and treatment providers have a chance at addressing the underlying risk factors before crime occurs. So far, the risk factor

paradigm has failed at establishing risk factors that reliably distinguish homicide offenders from non-homicide offenders. Although certain risk factors are more common among homicide offenders compared to other offenders, false positives occurred in upwards of 90% of cases (see Loeber et al., 2005; Loeber & Farrington, 2011). In other words, developmental risk factors common among homicide offenders also tend to be common for other serious and violent offenders (Loeber & Farrington, 2011).

Despite prevailing assumptions about homicide offending as representing an escalation in patterns of violence, studies also tend to observe few if any differences in prior patterns of offending between homicide offenders and other offenders. Using retrospective data on 455 habitual adult male offenders, DeLisi et al. (2011) observed that chronic offending, measured by arrests, was not associated with prior homicide offending. Similarly, in their study of the population of young homicide offenders in England and Wales, Rodway et al. (2011) found that only 52% of homicide offenders had a prior conviction. Farrington et al. (2012) found that homicide offenders were *less* likely to be chronic offenders relative to other offenders. In effect, once studies acquired more generalizable samples, comparison groups, and more precise measures of risk, evidence began to emerge that traditional risk factors and indicators of prior offending are not helpful in identifying who is likely to engage in a future homicide offense (also see Toupin & Morissette, 1990 for a Canadian study).

It is clear from this third generation of studies that the accumulation of risk factors does seem to matter for offending more generally. However, these third generation studies failed to develop a theoretical understanding of the contexts in which homicide offenses occur.

Proposal for a Fourth Generation

Neither psychological perspectives nor sociological perspectives are fully capable of making sense of variability in homicide offending. On the other hand, the risk factor paradigm's approach to throwing everything but the kitchen sink into an atheoretical model of homicide offending has resulted in a limited understanding of the phenomenon of homicide offending. One way to understand homicide offending is through the lens of theoretical perspectives on risky lifestyles. Most homicide offenses are unplanned (i.e., manslaughter rather than first- or second-degree murder). Individuals may find themselves in the wrong place, at the wrong time, and in the wrong conflict. This led Farrington et al. (2011) to suggest that homicide is an unpredictable event. An alternative perspective is that a criminogenic lifestyle results in exposure to situations and events that increase the likelihood of homicide event occurring. In effect, focusing on the person and their psychopathology is too narrow. Focusing on neighborhoods plagued by violence is too broad and can result in over policing of certain communities. A balance between these two perspectives is to examine the social lives of individuals that influence risky lifestyles. These social lives may represent a balance of who and individual is (i.e., psychological factors) and where they are (i.e., neighborhood and other community-level factors). One way to effectively measure social lives is through a person's social network (Ryu

& McCuish, 2022). Who a person spends time with may expose them to situations that call for violence, increasing the likelihood that at least one of these situations results in a homicide offense.

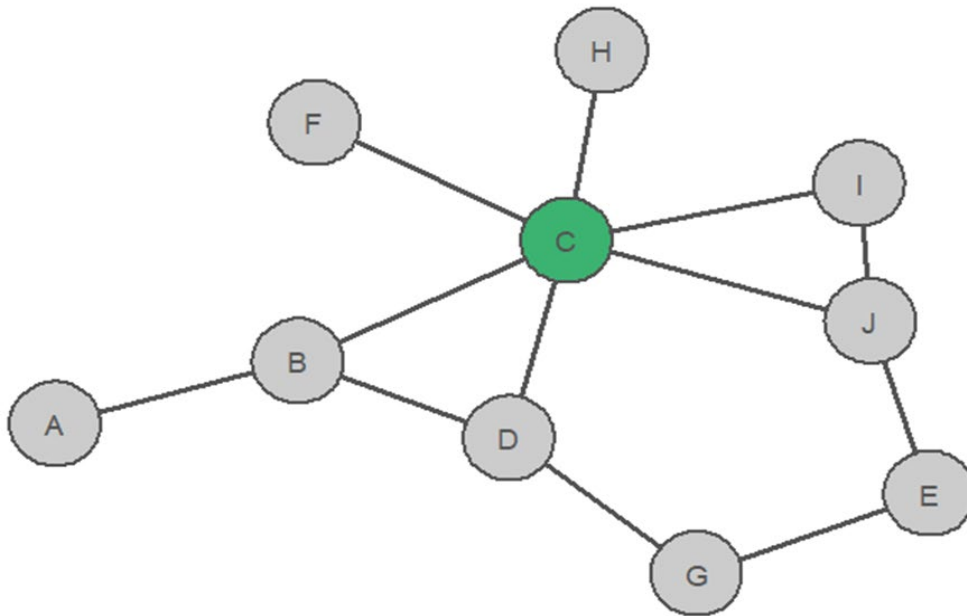
Section II: Social Network Analysis

SNA represents a departure from the risk factor paradigm that attempts to explain homicide offenses as the accumulation of different individual-level risk factors such as gender, gang involvement, and substance use. These types of explanations ignore the interdependence of individuals within groups. This has important implications for policy because trying to change individual-level risk factors for homicide may not be enough if the person is embedded within a social environment that favors participating in crime (McGloin & Kirk, 2010). It is thus important to respond to both individual-level risk factors and a person's broader social network. Social networks can constrain or enhance criminal behavior (Haynie, 2001; McGloin & Kirk, 2010).

Social networks refer to connections between persons or groups, including friendship ties, criminal peer ties, and conflict ties (Bouchard & Malm, 2016). Most network theories focus on the formation of ties between actors and how such ties provide benefits (Borgatti & Lopez-Kidwell, 2014). For example, ties to a greater number of different actors may be an indicator of a person's social capital (Lin et al., 2001). Patterns of interactions between people, and the type of interaction associated with these people, are of particular interest when examining social networks. The mapping of relationships helps more directly measure a person's social world, as opposed to making assumptions that certain individual-level characteristics (e.g., age, gender, ethnicity, gang status) dictate what a person's network might look like. In other words, SNA measures, rather than assumes, social structure (Knoke & Yang, 2008). In a criminological context, SNA helps measure criminal social capital (Ouellet & Bouchard, 2017). Having more ties to more offenders helps expand a person's pool of potential accomplices for certain crimes (McCuish et al., 2015; McGloin & Kirk, 2010; Tremblay, 1993).

SNA represents a set of theories and analytic strategies to map, describe, and explain the social structure of individuals and criminal groups. Being a member of an organized crime group is not necessary for SNA to be effective. In fact, SNA is useful for delineating the boundaries of group structures, such as who is, and who is not, a member of a particular gang or crime group (Bouchard, 2020; Bouchard & Malm, 2016; McGloin & Kirk, 2010). Actors exist in a networked world in which their transactions are not independent; the nature of their social network can constrain criminal behavior or provide opportunities for criminal behavior depending on the shape of their network (Bouchard & Malm, 2016). Social networks help to understand who is more likely to engage in a particular kind of offense, including the types of homicide offenses that are relevant to the current study (e.g., McCuish et al., 2015).

The fundamental units of analysis in SNA are nodes and the edges that connect them. Nodes refer to actors, whether it be a group or an individual, within a particular network. Edges refer to whether there is a social tie (e.g., co-offending tie) exists between nodes. Figure 1 shows a hypothetical network of ten members of a street gang. Each node (circle) represents a member of the gang. Each edge (line) represents a co-offending tie between two nodes.



Regarding the overall network, metrics such as density are informative of a network's cohesiveness. Density is calculated as the proportion of possible connections that are formed in the network. With 10 nodes in Figure 1, each can form nine possible ties ($k = 90$). With 11 total ties in the network, the density value equals 0.12. A denser network suggests a much more integrated and cohesive gang, whereas a sparser network could suggest the presence of key brokers who create connections between otherwise unconnected actors. A denser network is more likely to have triadic closure. Triadic closure represents the probability that a connection exists between B-C if connections also exist between A-B and A-C. In Figure 1, an example of triadic closure exists between nodes "C", "I", and "J". An example of the absence of triadic closure can be seen between nodes "C", "F", and "H". Another indicator of the overall network structure is geodesic distance, which refers to the average shortest distance an individual within the network must travel to reach all other actors in the network. This measure of social distance indicates the number of edges away individuals are from all other actors within a network.

Regarding characteristics of specific individuals in the network, degree, betweenness, and closeness centrality are three metrics informative of a person's connectivity to others. Degree centrality represents the total number of ties that an ego has to others in their ego network¹. For example, with co-offending ties to six other nodes, "Node C" has the highest level of degree centrality in the network in Figure 1. Betweenness centrality measures the total count of shortest paths that a node resides on between other nodes. It represents an individual's level of brokerage, meaning their capacity to function as bridges between actors who are otherwise unconnected². In this case, "Node C" is highest in betweenness centrality as they routinely function as an intermediary between nodes that are unconnected (e.g., they fall on the shortest path length between "Node D" and "Node H"). Closeness centrality functions as an individual-level measure of geodesic distance and is informative of the level of network embeddedness of an individual (Borgatti et al., 2002). Similarly, ego network density (rather than network density) reflects the proportion of connected actors in a person's ego network.

These different indices can help identify which actors are key players in a criminogenic network. For example, for homicide offenders, higher levels of degree centrality may imply a lifestyle defined by routine, repeated interactions with persons who are also crime-involved and typically involved in conflicts with others that may culminate in a homicide offense. Higher levels of betweenness centrality may make someone a "suitable" homicide offender because they are able to reach actors that another offender is otherwise unconnected to (McCuish et al., 2015).

In an ego network, actors connected to the ego are referred to as "alters" (Borgatti et al., 2013). The ego network also includes ties among alters. This allows for an inspection of the nature of an ego's positioning or embeddedness within their own network and the nature of their interrelationships with other actors.

Social Networks and Homicide

Social network characteristics are informative of whether a person's criminogenic network influences their involvement in criminal behavior, vice-versa, or both. Gang murder is best understood, not by searching for its individual determinants/risk factors, but by examining the social networks of action and reaction that create it (Papachristos, 2009). McCuish et al. (2015) showed that involvement in a homicide offense could be a catalyst for increasing an offender's degree centrality (e.g., increasing criminal social capital) and also that those who were more central gang members were more likely to be recruited to perpetrate a homicide offense. It is possible that these results extend beyond this one specific gang and that network centrality influences general homicide offending. It is also

¹ An ego network is the personal network of a specific person. It looks at the number of persons to whom they have a direct social tie.

² In formal terms, betweenness centrality represents the number of instances in which a node falls along the shortest path length between two unconnected nodes.

possible that homicide offending helps propel an individual into remaining, or even being more of a force, within criminogenic networks.

Section III: Method

The ISVYOS was developed to better understand serious offending by youth. Participants were recruited from various custody centers primarily located in the Greater Vancouver Regional District between 1998-2011. During this time, youth justice system was designed to reserve the use of custody for youth who engaged in frequent, serious, or violent offending. The Canadian justice system does not incarcerate youth with adults, even when youth receive adult sentences, meaning that youth involved in the most serious and violent offenses were not excluded from the study. This made the sample useful for addressing questions about homicide offending given that the study's research design focused on sampling especially serious and violent offenders.

Sample

The data in this report come from the Incarcerated Serious and Violent Young Offender Study (ISVYOS). The ISVYOS includes 1,620 individuals from BC who were incarcerated in adolescence and had criminal history data available. Among this group, we identified and coded the criminogenic networks of 79 homicide offenders³. Homicide offenders included persons who were arrested, charged, or convicted for any of the following offenses: first degree murder, second degree murder, attempted murder, manslaughter, criminal negligence causing death, and conspiracy to commit murder. We included offenses such as attempted murder given that the intent of the offense is the same as first- or second-degree murder and all that differs is the outcome. This approach is consistent with the scientific literature (e.g., Heide et al., 2001; McCuish et al., 2018). Myers, Scott, Burgess, and Burgess (1995) asserted that progression from attempted murder to murder was primarily the result of chance and what often distinguished attempted murder from murder was the health of the victim at the time of the offense (DeLisi et al., 2014; Hagan, 1997; Heide et al., 2001).

As earlier research made clear, it is impossible to truly understand why homicide offending occurs without a comparison group. Since the focus of this study was on social networks, we wanted a comparison group that was exposed to a similar social environment. As such, for each homicide offender we identified 76 ISVYOS participants

³ The homicide offender group was significantly more likely to be male compared to the remainder of the ISVYOS sample. This is not necessarily surprising given homicide offenses are typically committed by males (Kubrin, 2003). The homicide subgroup did not differ from the remainder of the ISVYOS sample in terms of ethnicity. This is different from studies in the United States that tend to report that Black and Hispanic persons are involved in homicide offenses at a disproportionate rate (Kubrin, 2003). Unsurprisingly, the homicide offender group was significantly more likely to have received a federal custody sentence and to have been involved in an offense with a firearm.

who were not involved in a homicide offense but who were incarcerated in adolescence during the same time-period⁴. Accordingly, each homicide offender had at least one non-homicide offender from the control group with whom their period of incarceration overlapped. Accordingly, they were exposed to a similar custody context and era. In total, the networks of 155 offenders were coded.

Table 1 outlines demographic and offending history differences and similarities between the two groups. The control group had a significantly higher prevalence of female offenders compared to the homicide offender group. The ethnic composition of the two groups did not significantly differ. About half of all persons were White, 30% were Indigenous, and 20% were from a non-Indigenous minority group (e.g., Black, Hispanic, South-East Asian, Chinese). At the time of inclusion in the study, the ages of the homicide offender subgroup and control group were nearly identical at approximately 34 years of age. Nearly 10% of members of both groups died during the follow-up period. Approximately two-thirds of the homicide offender subsample had a history of firearm offenses compared to just 20% of the control sample. The same difference was also observed when looking at history of having received a Federal custody sentence. Between ages 12–29, the two groups averaged the same number of convictions, but, not surprisingly, the homicide offender subgroup spent twice the amount of time incarcerated as the non-homicide offender subgroup.

Table 1. Characteristics of Homicide Offenders and Non-Homicide Offenders.

	Homicide Offenders (<i>n</i> = 79)	Non-Homicide Offenders (<i>n</i> = 76)	
Demographic Characteristics	% / Mean	% / Mean	χ^2/t , df, <i>p</i>
Male	97.5% (77)	81.6% (62)	$\chi^2 (1) = 10.57, p = .001, \Phi = .26$
Ethnicity			
Indigenous	29.1% (23)	34.2% (26)	
White	50.6% (40)	51.3% (39)	$\chi^2 (2) = 1.07, p = .587, \Phi = .08$
Non-Indigenous Minority	20.3% (16)	14.5% (11)	
Age at Coding	34.28 (5.07)	33.95 (4.89)	$t (153) = 0.42, p = .679$
Deceased	8.9% (7)	10.5% (8)	$\chi^2 (1) = 1.23, p = .726, \Phi = .03$
Criminal History			
Firearm Offense	65.8% (52)	25.0% (19)	$\chi^2 (1) = 26.00, p < .001, \Phi = .41$
Federal Custody	63.3% (50)	19.7% (15)	$\chi^2 (1) = 30.18, p < .001, \Phi = .44$
Total Convictions Ages 12–29	27.23 (16.50)	27.70 (16.54)	$t (114) = 0.16, p = .877$
Days Incarcerated Ages 12–29	2346 (1256)	1147 (1051)	$t (114) = 5.53, p < .001$

⁴ This control group resembled the demographic characteristics of the remainder of the ISVYOS sample who were not included in this network study.

Procedures

The ISVYOS conducted interviews with incarcerated youth and collected file-based information on risk factors associated with the continuation of this activity into adulthood. To recruit participants, the BC Ministry of Children and Family Development (MCFD) provided informed consent. This allowed the research team to approach youth in custody centers throughout BC. Youth were approached on their living unit and asked whether they would like to participate in the study. To obtain assent, participants were read and given a copy of an information sheet explaining the purpose of the study, how information would be collected (e.g., interview and file information), that they could withdraw at any time, and that information would be kept confidential unless the participant threatened to hurt themselves or someone else.

Social network data for each of the 155 persons included in this study. Each participant represented an ego and ties were coded between egos and alters and between each ego's alters. Ethical constraints prohibited examining individuals that were not members of the study. The network procedures involved using a computerized software system, the Corrections Network (CORNET), to code distinct types of ties formed between the egos and their alters. We coded all available data from CORNET. Available data includes alerts by custody staff, police, and the courts regarding (a) individuals that an ego co-offended with, (b) individuals that an ego victimized (e.g., assaulted), and (c) individuals that an ego had a conflict with. CORNET also includes daily logs completed by criminal justice practitioners in the community and in prison (e.g., probation officers, correctional officers, social workers). Logs could include custody officer reports about the behavior of egos, institutional incident reports, case management reports, risk assessments, emails between criminal justice system colleagues regarding the status of the ego, ego complaint forms, court-ordered no-contact orders, and pre-sentence reports, among other sources. All network data were coded in edgelist format. Ties were coded from a person's first entry on CORNET until the date of data collection. All social network data were anonymized, which involved identifying whether an individual in one ego-network was the same individual as in another ego-network. Actors in multiple ego-networks with the same first and last name, or the same Correctional Service number, were classified as a single actor in the total combined network. In instances where a single name was provided, the date and the location of the interactions were used to verify the actor's identity. In any (rare) instance where it was not definitive whether multiple actors were the same individual or different individuals, they were coded as separate actors in the network. This may imply that the number of mutual ties among the egos is underestimated and the number of unique alters in the network may be overestimated.

Network Measures

The ISVYOS included many different types of measures derived from structured interviews, risk assessment data, and criminal history data. For this report, the most relevant measures to discuss were derived from the collection of social network data. Social network data were collected for all 155 persons included in the current study.

For each participant, ego networks were coded by ISVYOS research assistants. Ties were coded between egos and alters and between the alters for each ego. The network procedures involved using a computerized software system, the Corrections Network (CORNET), to code network ties. Ties were coded by reviewing all available information on CORNET, including daily logs completed by criminal justice professionals. Logs included correctional officer reports about the behavior of egos, institutional incident reports, case management reports, risk assessments, emails between criminal justice system colleagues regarding the status of the ego, complaint forms completed by the ego against others, court-ordered no-contact orders (e.g., as the result of a co-offense), and pre-sentence reports, among other sources. Ties were coded from a person's first entry on CORNET until the end of the most recent wave of data collection in the Summer of 2022.

Co-offending ties included criminal offenses but also behaviors in prison that resulted in an official charge or warning from prison administration (e.g., tampering with prison cells, assaults on inmates, contraband). Social ties were recorded for all interactions that were unrelated to offending but were also not involving conflict (e.g., an ego and alter attending a probation office appointment together, two individuals noted to be spending time "heavying" other persons in custody). Conflict ties included instances in which there was a conflict between the ego and their alter. This included mutual conflict or instances in which there was a clear victim and a clear aggressor (e.g., threatening to assault another inmate). The location of the tie was coded to distinguish whether the connection occurred in the community or in custody. Density, triadic closure, and geodesic distance were used to measure characteristics of the overall network. Ego network degree centrality, betweenness centrality, and density were the main metrics used to measure the network positioning of ISVYOS participants.

Analytic Strategy

The analytic strategy proceeded in three steps in accordance with the three research questions of interest in the current report. In the first step, the full criminogenic networks across all ages was measured for all members of the sample. This included the full network comprising each type of tie (i.e., co-offending, social, conflict) from each location (i.e., prison and community). Trajectories of degree centrality between ages 12–40 were plotted and compared across homicide and non-homicide offenders. This allowed for an examination of whether homicide offenders or non-homicide offenders had larger criminogenic networks, whether this varied by age, and whether this varied by tie-type or location. Attention was specifically given to networks before versus after age 22, which represented the average age of homicide offenders at the time of their homicide offense. This facilitated an independent samples t-test comparison of whether criminogenic networks were larger pre-homicide, post-homicide, and altogether when compared to the networks of non-homicide offenders. In effect, were individuals involved in homicide offenses associated with a more criminogenic lifestyle compared to other offenders, and did this influence their involvement in a homicide offense? Consequently, was involvement

in a homicide offense a potential 'shock' that amplified an offender's criminogenic network?

In the second step, networks of homicide offenders were compared pre-homicide versus post-homicide to allow for a more direct interpretation of how criminogenic networks compared before versus after involvement in a homicide offense. Paired-sample t-tests were performed to evaluate whether there were significant differences in network centrality before versus after perpetrating a homicide offense. This allowed for a direct investigation of whether being involved in a homicide offense influenced a change in network centrality. For example, did perpetrating a homicide offense increase criminal capital or "street cred". Analyses were performed to evaluate whether change occurred across type of network centrality, tie-type, and tie-location.

In the third step, we take a closer look into the networks that are generated from homicide events, with a special emphasis on the nature of gang involvement in these events.

Section IV: Comparing Homicide and Non-Homicide Offenders

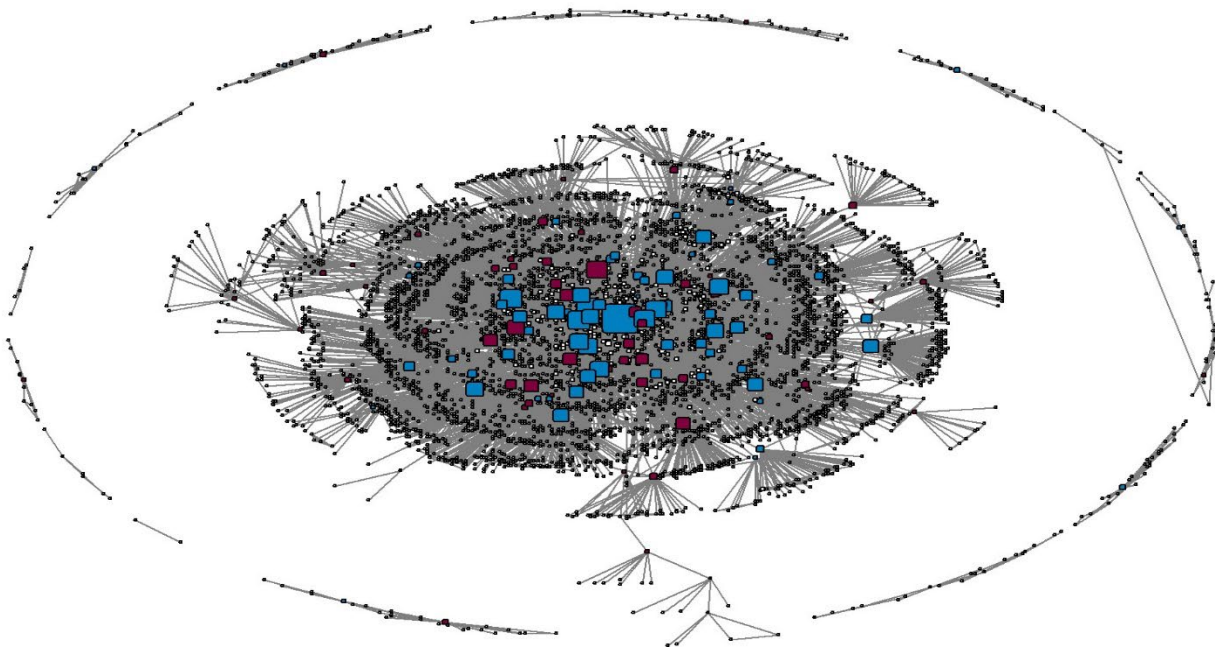


Figure 2. Full Network. Blue nodes represent homicide offenders, purple nodes represent non-homicide offenders, and white nodes represent alters from the ego networks of ISVYOS participants. The full network includes all types of ties (i.e., social, co-offending, conflict) and from both locations (i.e., community, prison).

Figure 2 shows the full network for all participants, which includes ties formed in both prison and the community and each type of tie (i.e., social, co-offending, conflict). Nodes in white represent the alters of homicide offenders (blue) and non-homicide offenders (purple). Nodes are inflated according to their degree centrality. The network includes a

total of 5,530 nodes, meaning that the 155 offenders included in the sample averaged approximately 35 different criminogenic ties. A total of 17,696 ties were formed in the network. Density was especially low (0.001), meaning that less than 1% of all possible ties that could be formed were formed. The network includes 35 components, with the main component accounting for approximately 90% of all nodes and ties in the network.

Figure 3 resembles Figure 2, but Panel A shows ties formed solely in prison and Panel B shows ties formed solely in the community. The prison network included more nodes than the community network (3882 versus 2043) and the prison network included more ties than the community network (12722 versus 5412). Density was low in both networks (.001). Figure 4 also reflects the same format as Figure 2, but Panel A shows social ties only, Panel B shows co-offending ties only, and Panel C shows conflict ties only. The network depicting criminogenic social ties had more nodes and ties (3624, 11,192) compared to both the co-offending network (732, 1,912) and conflict network (2,548, 5,498). Density was low across all networks but higher in the co-offending network (.004) compared to the social tie (.001) and conflict tie (.001) networks.

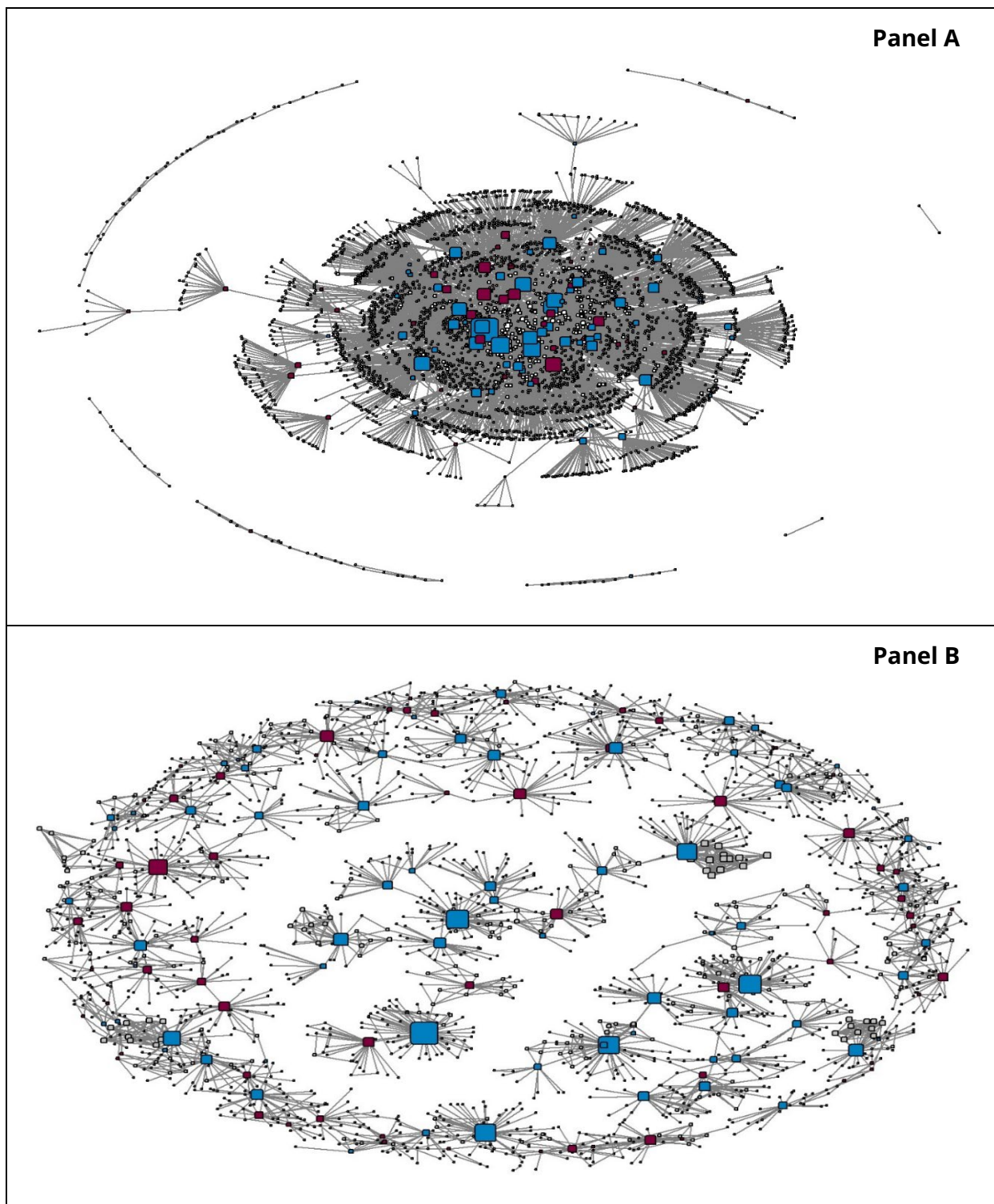


Figure 3. Prison (Panel A) and Community (Panel B) Network Structures. Blue nodes represent homicide offenders, purple nodes represent non-homicide offenders, and white nodes represent alters from the ego networks of ISVYOS participants.

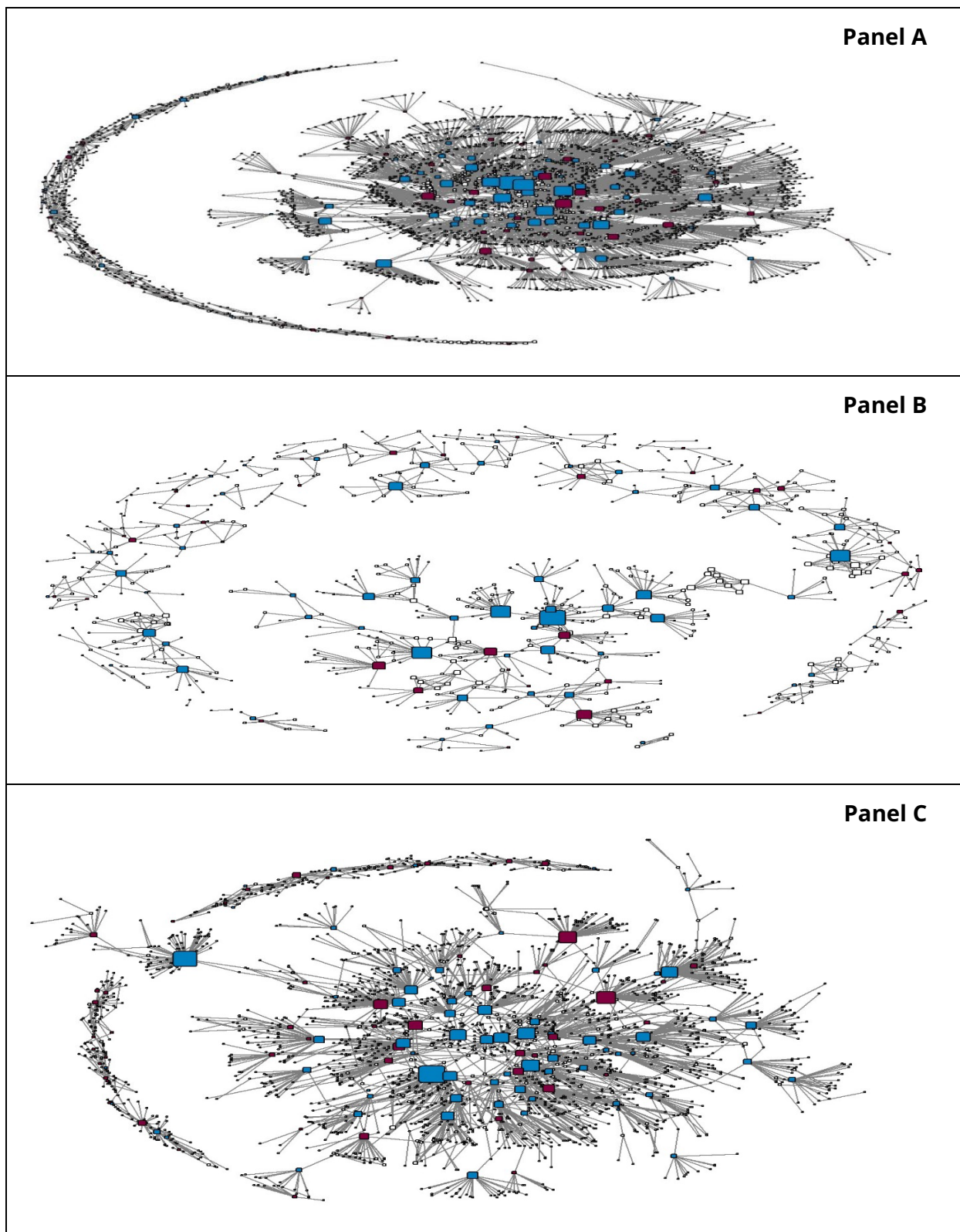


Figure 4. Social (Panel A), Co-Offending (Panel B), and Conflict (Panel C) Network Structures. Blue nodes represent homicide offenders, purple nodes represent non-homicide offenders, and white nodes represent alters from the ego networks of ISVYOS participants.

What is of interest is whether homicide offenders are differentially positioned in the above networks compared to non-homicide offenders. The general trend across all graphs is that homicide offenders tended to be positioned at the center of each network. Indeed, the nodes in each network, which are sized according to degree centrality, show that homicide offenders (blue nodes) tend to be positioned towards the center of the network and are larger in size compared to non-homicide offenders (red nodes). To investigate network differences more systematically, Panel A of Figure 5 compares homicide offender and non-homicide offender ego network degree centrality and Panel B of Figure 5 compares homicide offender and non-homicide offender ego network betweenness centrality across the full network and when stratified by tie-location and tie-type. For each network investigated, independent samples t-tests showed that homicide offenders averaged significantly higher levels of degree centrality and betweenness centrality compared to non-homicide offenders. In effect, looking at lifetime networks, homicide offenders had more ties in prison, in the community, to other persons involved in crime, to co-offenders, and to conflict with others. Comparison of effective size, which reflects ties to more central actors, reiterated these findings (not shown for space considerations). For all types of networks examined, ego network density did not vary between homicide offenders and non-homicide offenders.

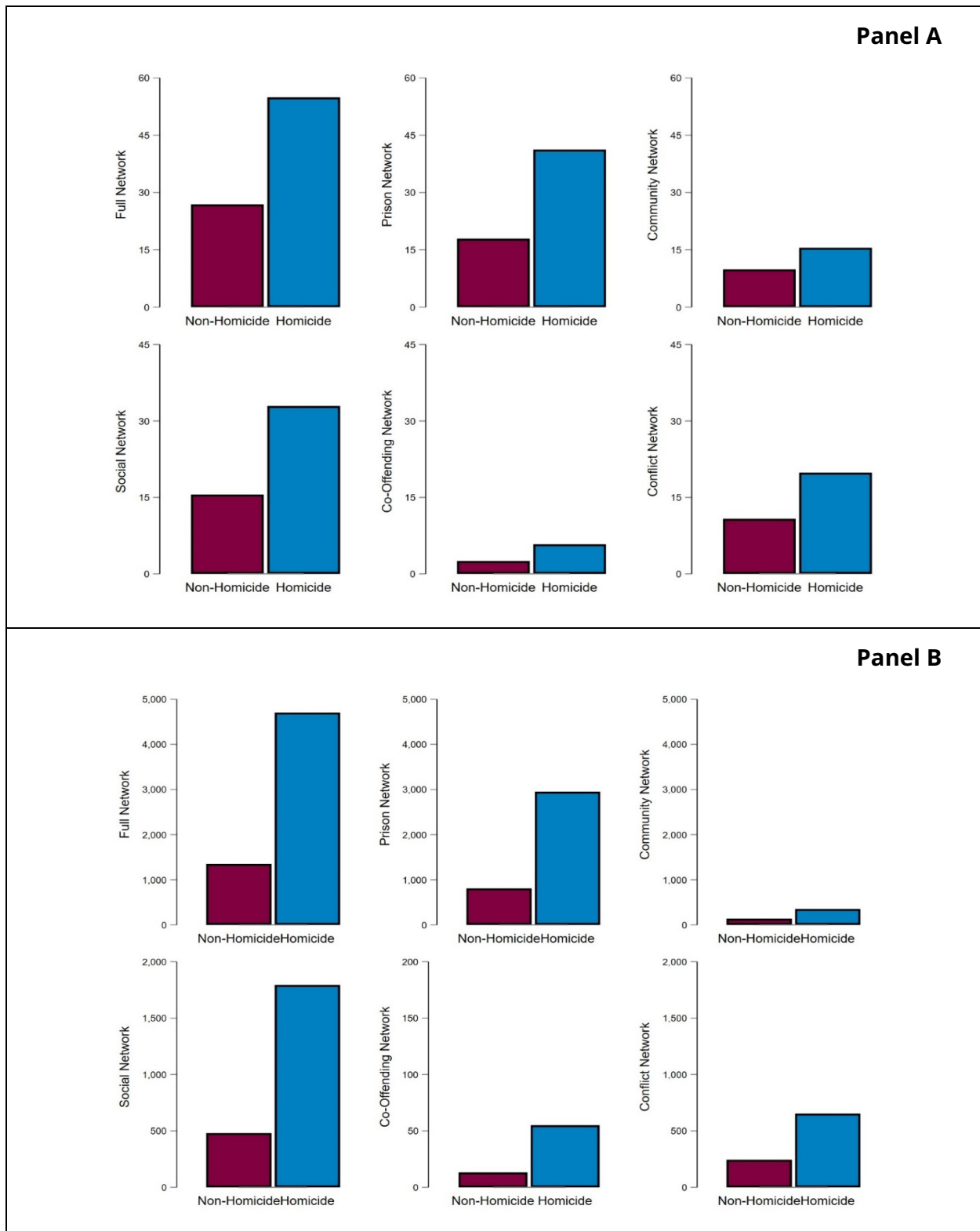


Figure 5. Comparison of Degree (Panel A) and Betweenness (Panel B) Centrality across Homicide and Non-Homicide Offenders.

Explaining Differences in Network Structure: Does Homicide Matter?

The above comparisons show that homicide offenders were more central across all networks focused on lifetime networks. A critical question to address is where and when these differences emerged. Were homicide offenders more central in the networks examined because (a) having a larger network facilitated a homicide offense or (b) having committed a homicide offense created a larger criminogenic network? We find evidence that the answer is yes to both of these questions. Figure 6 below shows the network trajectories of degree centrality across age. These trajectories illustrate that homicide offenders had larger networks at almost every single year of age examined. Of particular interest is age 22, which represents the mean age of offenders at the time of their homicide offense. These trajectories show that homicide offenders tended to have larger networks both prior to age 22 (i.e., before their homicide offense) and from age 22 onwards (i.e., including and after their involvement in a homicide offense). It is important to keep in mind that these trajectories are not cumulative; they represent the number of ties accumulated at each year of age. In effect, if homicide offenders' networks were reset at the time of their homicide offense, the networks ties that they accumulated after their homicide were greater than the ties accumulated by non-homicide offenders over the same period of age.

The examination of criminogenic network trajectories demonstrates that (a) having higher levels of criminogenic social capital and being in conflict with others may facilitate homicide involvement and (b) homicide offenders, by virtue of having larger criminogenic networks post-homicide involvement, may be an example of how specific individuals can act as brokers or spreaders of violence throughout communities (Smith & Papachristos, 2022). Independent samples t-tests supported the conclusion that at nearly each year of age, homicide offenders incurred more criminogenic ties than non-homicide offenders, and this was true regardless of the location of the tie or type of tie examined. However, there were also clear trends about what mattered most. For example, the difference in number of prison-based ties was clearly larger compared to the difference in number of community-based ties. For co-offending, there was a curious large drop in number of ties that occurred at age 24 for homicide offenders. We suspect that this may reflect this group being incarcerated given that this was the age just after the average age of homicide offending. In effect, more time spent in prison during this age may have restricted opportunities for co-offending. This is not to suggest that prison worked to reduce offending. In fact, the number of ties formed in prison for homicide offenders may reflect prison as a 'school of crime' (Dobrin et al., 2005; Nguyen et al., 2017) in which offenders with a certain status (e.g., homicide involvement) are able to leverage that status in prison as a means of developing higher levels of criminogenic social capital.

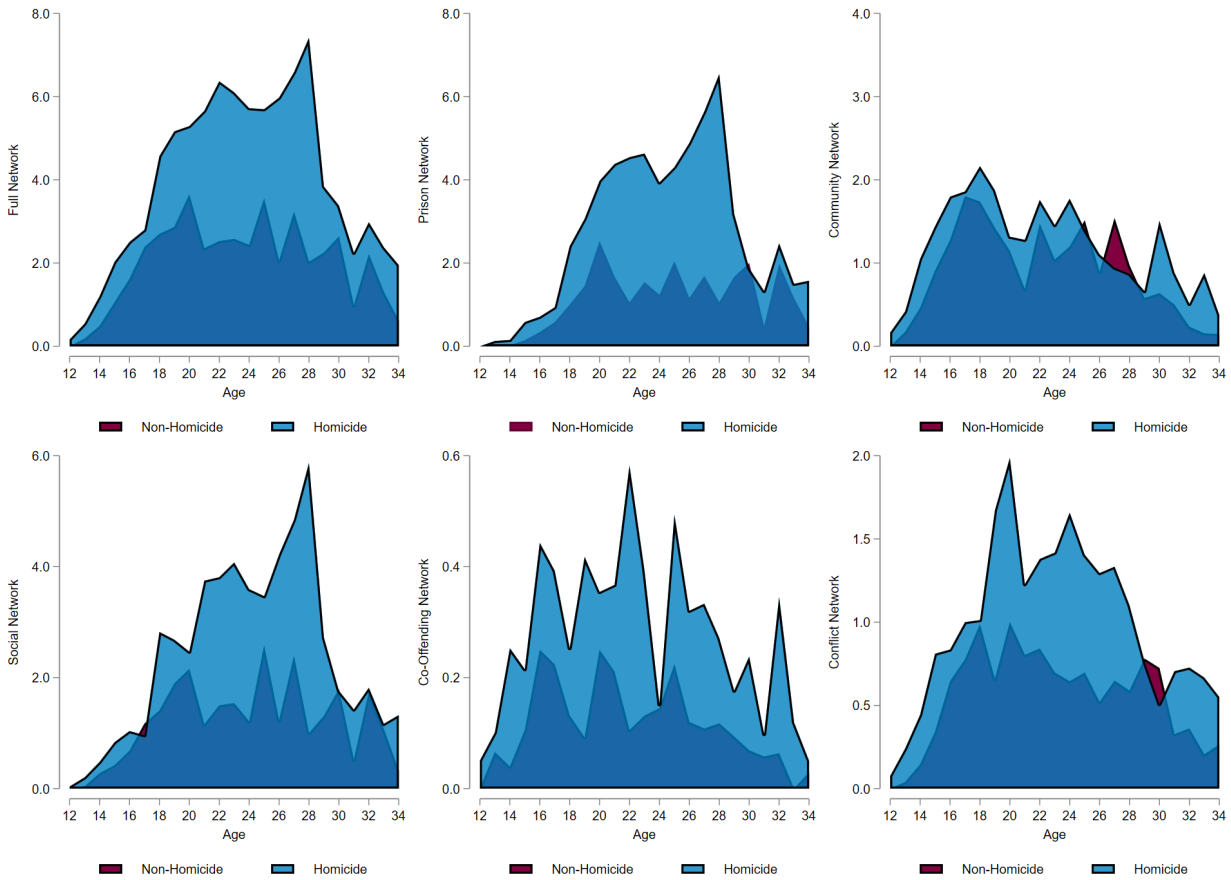


Figure 6. Trajectories of Degree Centrality for Homicide Offenders and Non-Homicide Offenders.

Whereas the above trajectories look at individual ages, Figure 7 compares degree centrality for homicide offenders and non-homicide offenders before the average age of homicide and then after the average age of homicide. This figure shows that homicide offenders tended to have larger networks before their homicide and then the perpetration of the homicide possibly propelled them to continue to have larger criminogenic networks compared to non-homicide offenders. The ratio of difference in degree centrality was approximately 2:1 across each type of network examined, including the conflict tie network. For example, homicide offenders averaged approximately twice the number of conflict ties as non-homicide offenders during the 10-year period leading up to their homicide. Similarly, homicide offenders averaged twice the number of co-offenders during this period compared to non-homicide offenders. **In effect, homicide offenders had a network defined by greater levels of conflict and more connections to a pool of potential criminal accomplices who could facilitate, or expose them to, opportunities or circumstances leading to a homicide offense.**

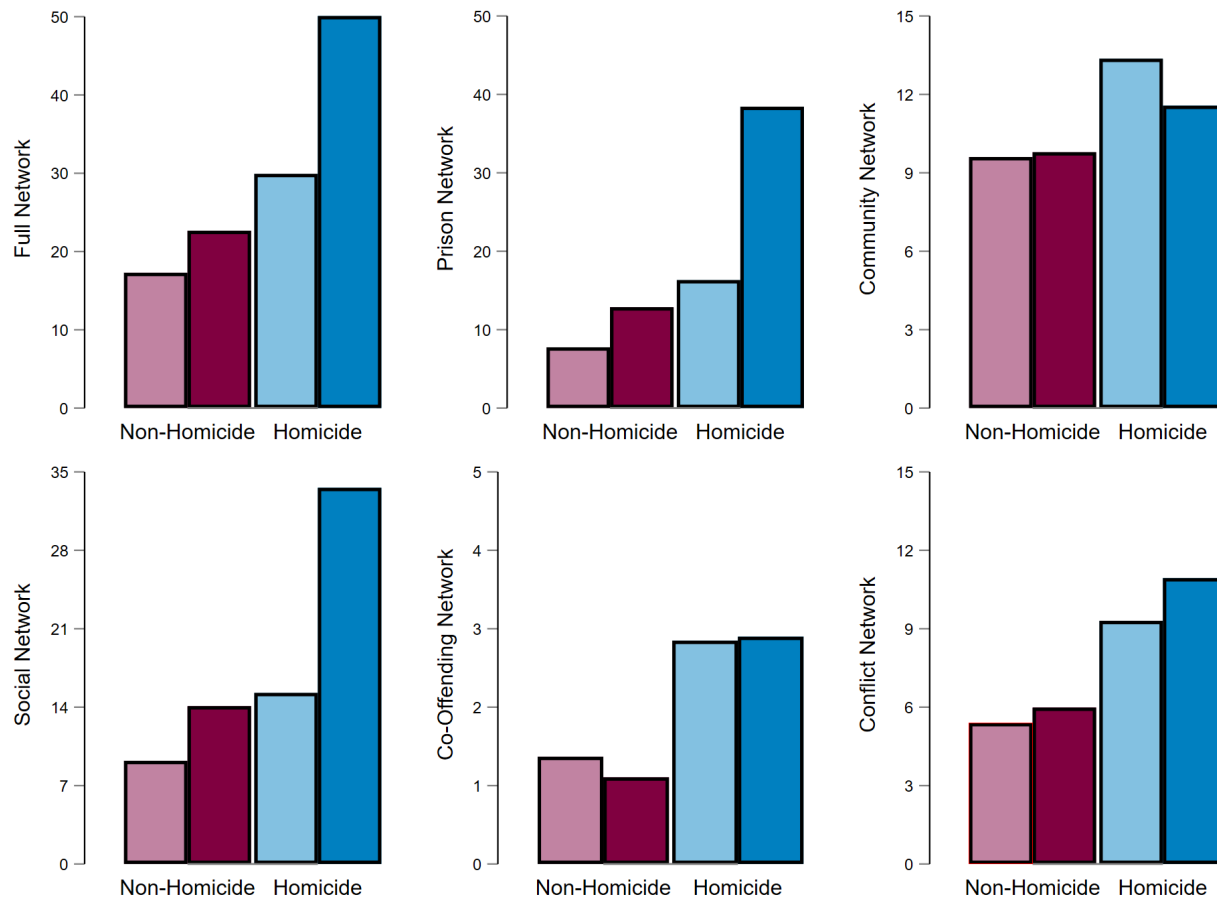


Figure 7. Comparing Degree Centrality Before Versus after the Average Age of Homicide Offending.

Overall, the analyses above showed quite definitively that (a) homicide offenders have larger criminogenic networks than non-homicide offenders and (b) homicide offenders are more likely than non-homicide offenders to be positioned as brokers.

Supplemental analyses showed that these conclusions were true whether ties were formed in prison or in the community and whether the analyses focused on social, co-offending, or conflict networks. In terms of understanding *how* a homicide happens, it appears that a criminogenic lifestyle defined by routine interactions with other offenders increases exposure to opportunities for a homicide offense. Further, following the homicide offense, homicide offenders continue to have larger criminogenic networks, reiterating their continued at-risk status for additional homicide offenses and other forms of offending.

Section V: Pre- Versus Post-Homicide Networks

Panel A of Figure 8 shows the networks of homicide offenders before their involvement in a homicide whereas Panel B shows all network ties of homicide offenders at the time of and following their involvement in a homicide offense. Although Figure 8 focused only on the ego networks of homicide offenders, some non-homicide offenders are observed due

to their status as an alter in the ego network. The pre-homicide network included 1,790 nodes and 5,124 ties compared to 2321 nodes and 7462 ties in the post-homicide network. The pre-homicide network was denser (.002) and had higher transitivity (.082) compared to the post-homicide network's level of density (.001) and transitivity (.078). Overall, homicide offenders tended to have larger networks post-homicide compared to pre-homicide. However, pre-homicide networks were more interconnected to the persons within their network, and we were more likely to observe triadic closure. A key hypothesis from Papachristos et al. (2015) was that “the company you keep” is critical for understanding serious offenses (p. 624). Violence may spillover within networks, and denser networks increase the chances of encounters with other persons involved in criminal behavior. These denser and more interconnected networks may have been more conducive to homicide offending because of the ease at which interactions with criminogenic others could occur. This reiterates the notion of a risky lifestyle, rather than pathology, being important for homicide offending. Indeed, features of psychopathy, measured in the current study using the Psychopathy Checklist: Youth Version (PCL:YV; Forth et al., 2003), were virtually identical when compared between homicide offenders ($M = 21.50$; $SD = 6.43$) and non-homicide offenders ($M = 21.59$; $SD = 5.96$). **Homicide spreads in an epidemic-like process (Papachristos, 2009) and higher levels of density may facilitate the spread of violence through networks, leading to an individual's involvement in a homicide offense.**

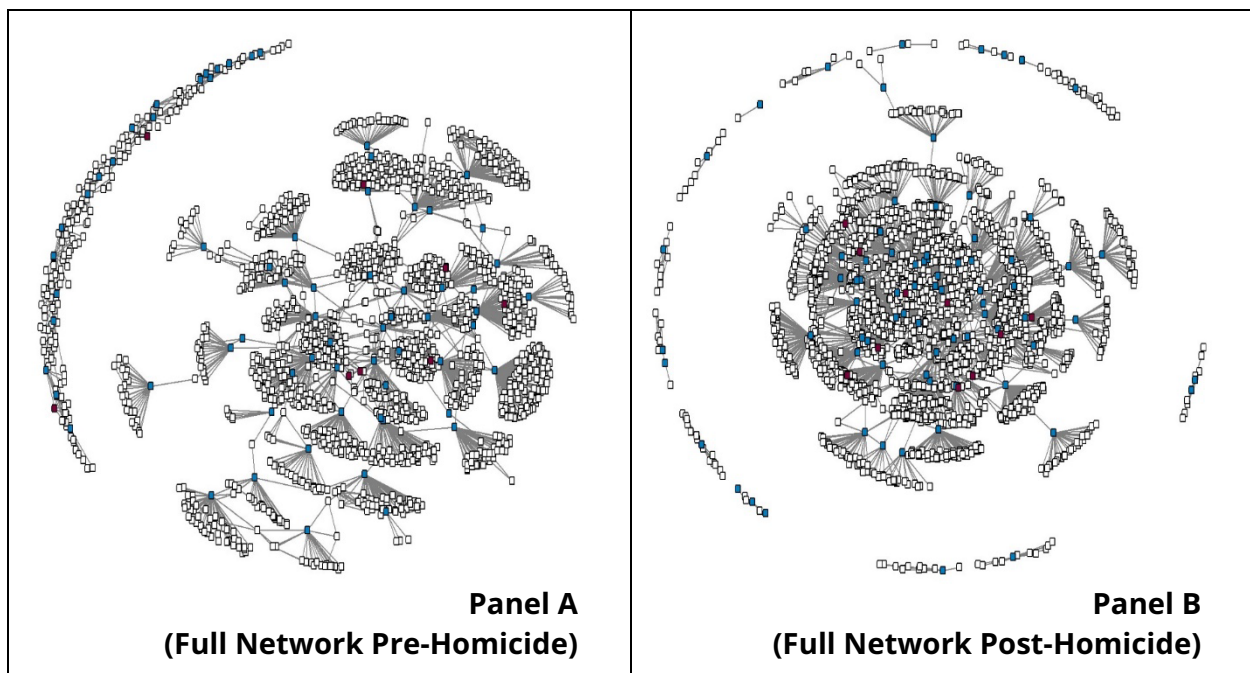


Figure 8. Homicide Offender Networks before (left) Versus after (right) their Homicide offense. Blue nodes represent homicide offenders. Purple nodes represent non-homicide offenders from the ego networks of homicide offenders and white nodes represent the remaining alters from the ego networks of ISVYOS participants.

To get a better sense of some of the differences described in the full network, pre- and post-homicide networks were distinguished in several ways, beginning with tie location. Figure 9 shows prison-based ties, with the pre-homicide network shown on the left and post-homicide network shown on the right. Homicide offenders clearly had fewer ties pre-homicide compared to post-homicide (1,146 nodes compared to 1,906 nodes and 3,100 ties compared to 6,170 ties). Density and transitivity were slightly higher pre-homicide, but this can be attributed to the tendency for larger networks to naturally be less dense. Despite the larger network post-homicide, there were fewer components to the network post-homicide (14) compared to pre-homicide (24). This suggests that not only did homicide offenders become more well-connected in prison following their homicide, their ease of access to other offenders improved. In other words, involvement in a homicide offense was associated with a network that became bigger and smaller all at once. Bigger in size, yet smaller and easier to reach the different actors observed in this network. Community networks told a different story. Unlike the examination of prison-based networks, homicide offenders had more nodes (785) and more ties (2,146) in the community prior to their homicide compared to the number of nodes (558) and ties (1,444) after their homicide. Density and transitivity in the community were higher in the smaller post-homicide networks. These differences may reflect the fact that being caught and adjudicated for a homicide offense would lead to more time spent in prison but may also reflect that homicide offending carries a certain prestige (see Morselli, 2003) that would be more valued in custody than in the community. In effect, individuals may become known for their homicide offense, which in turn gives them status among their peers in custody. Indeed, anecdotally, ISVYOS sample members involved in homicide were noted to engage in “heavying” and “bullying” tactics with multiple other offenders while in custody. Being a known homicide offender may be an attractor to others in prison who wish to earn favor of such persons, especially if they are gang involved.

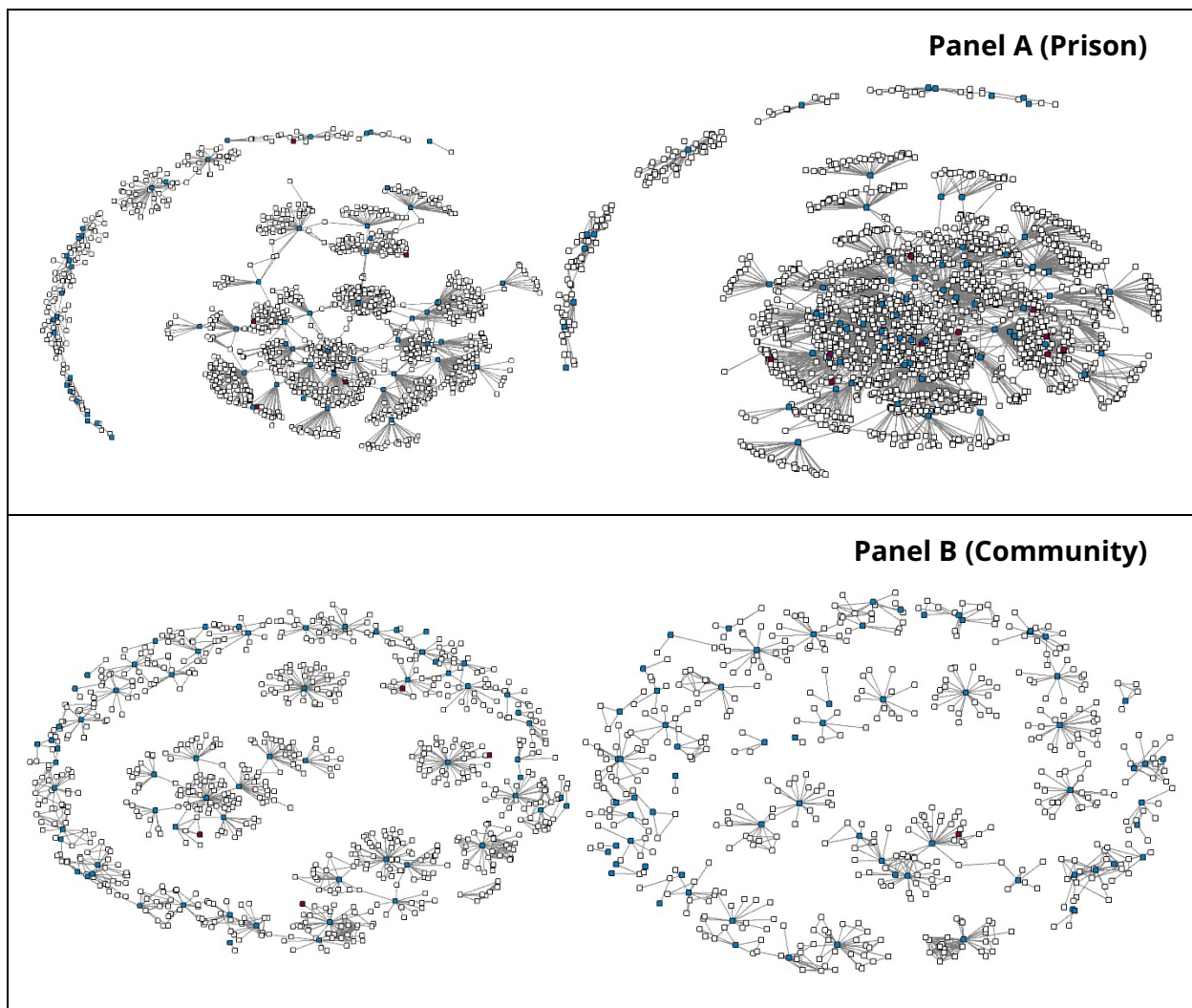


Figure 9. Prison (Panel A) and Community (Panel B) Network Structures before (Left) Versus after (Right) Homicide Involvement. Blue nodes represent homicide offenders. Purple nodes represent non-homicide offenders from the ego networks of homicide offenders and white nodes represent the remaining alters from the ego networks of ISVYOS participants.

Figure 10 below compares pre- and post-homicide networks defined by criminogenic social ties (Panel A), co-offending ties (Panel B), and conflict ties (Panel C). For social ties, while the number of nodes were similar prior to (1103) versus after (1603) the homicide offense, there were more ties in the post-homicide offense network (5,056) compared to the pre-homicide offense network (2,994). These social ties typically came from ties that were formed in prison versus the community. Density and transitivity were nearly identical. Co-offending networks were similar in size pre-homicide compared to post-homicide. Density and transitivity were also similar. What stands out in the co-offending networks is that the level of density (.09 and .10 pre- and post-homicide) and transitivity (.363-.427 pre- and post-homicide) is higher compared to other networks. Finally, the number of nodes and number of ties in the conflict networks were similar when looking at the pre-homicide network (845, 1716) compared to the post-homicide network (975, 1988).

The general conclusion here is that the type of network structure that influences homicide involvement may be different from the types of network structures influenced by homicide involvement. Specifically, while any type of criminogenic tie may be influential on homicide perpetration, homicide perpetration is especially influential on the acquisition of social ties. Whereas the public may view homicide involvement as a stigmatizing offense, within criminal subcultures, this may carry a certain level of status that is associated with gaining a greater number of criminogenic peers. These findings run counter to popular perspectives that homicide perpetration, especially by young people, is a matter of psychopathology, being an outsider, and having difficulty making friends (Bender, 1959). The idea that homicide involvement acts as a turning point for a more criminogenic social network is evaluated in greater detail in the section below.

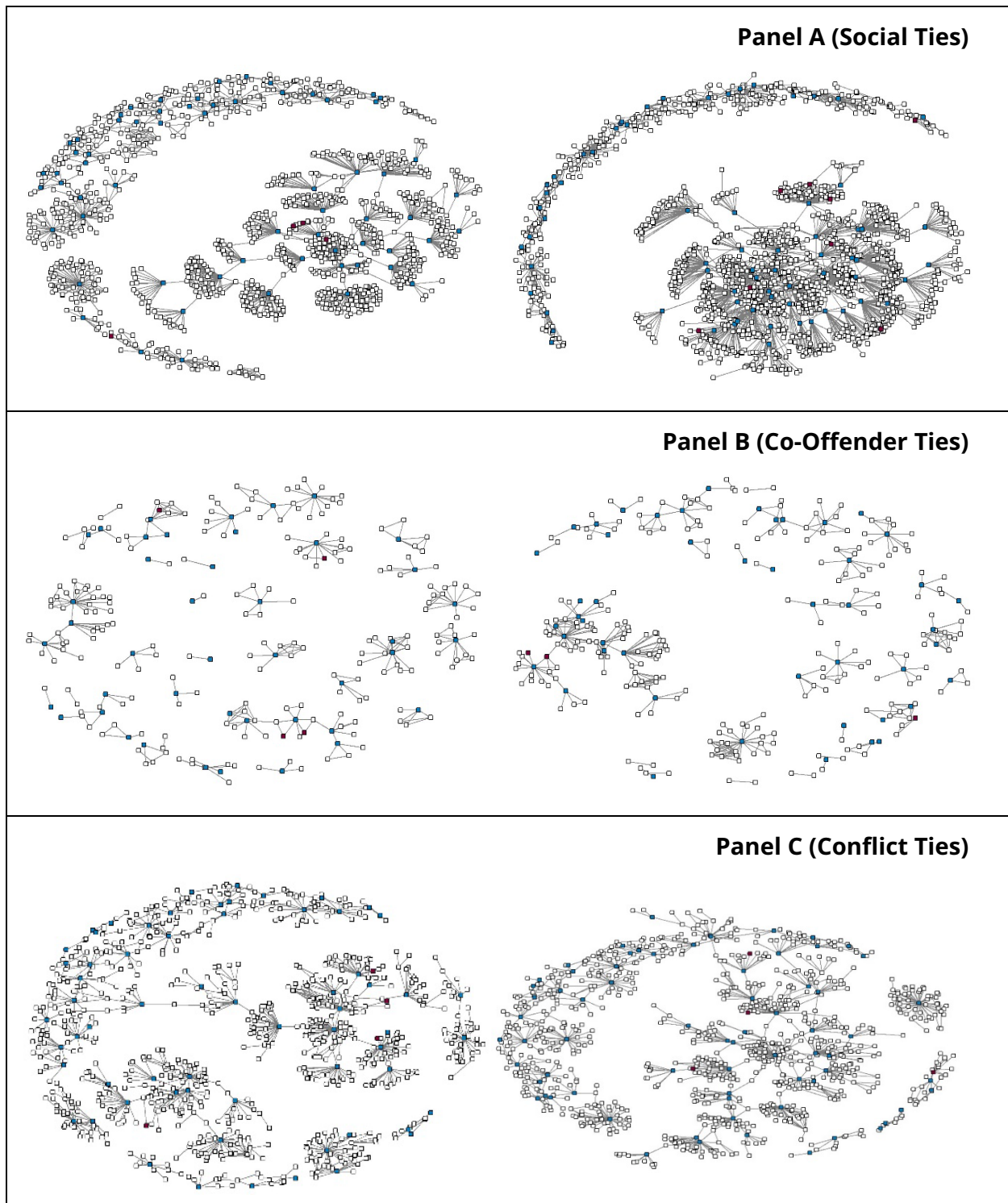


Figure 10. Social (Panel A), Co-Offending (Panel B), and Conflict (Panel C) Network Structure before Versus after Homicide Involvement. Blue nodes represent homicide offenders. Purple nodes represent non-homicide offenders from the ego networks of homicide offenders and white nodes represent the remaining alters from the ego networks of ISVYOS participants.

Did Ego Networks Change Following Homicide Offending?

To better understand pre-homicide versus post-homicide networks, paired samples t-tests were conducted to compare mean levels of centrality before versus after the homicide offenses. Figure 11 maps these differences in degree centrality. We did not repeat this Figure for betweenness centrality because the same trends emerged. Overall, the significantly greater difference in centrality observed in the full network was the result of significantly larger prison networks and social networks that formed post-homicide compared to pre-homicide. The size of the community networks, co-offending networks, and conflict networks were largely the same pre-homicide versus post homicide.

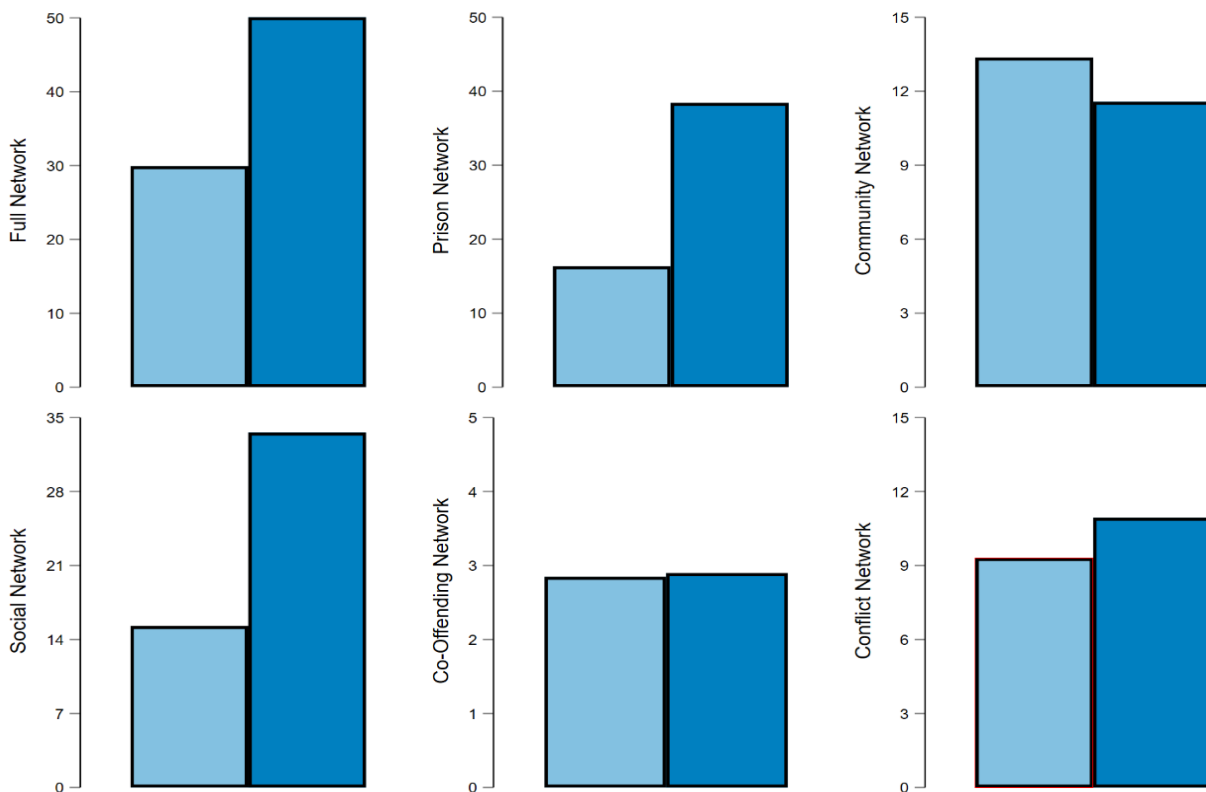


Figure 11. Degree Centrality before Versus after Homicide Involvement.

Figure 11 above, taken together with analyses from Section IV, indicate that (a) homicide offenders have larger networks than non-homicide offenders and (b) the differences observed between types of offenders cannot be attributed solely to the nature of their offense. In effect, homicide offenders have large networks even prior to their involvement in a homicide offense. However, prison-based ties and social ties, most of which stemmed from connections in prison, were quite clearly substantially more prominent in (a) the networks of homicide offenders compared to non-homicide offenders and (b) post-

homicide networks compared to pre-homicide networks⁵. Thus, homicide involvement appears to translate to more pronounced prison-based criminogenic social ties. Indeed, as shown in Figure 12 below, the post-homicide criminogenic social tie network included 5,056 ties, over 80% of these ties stemmed from connections that formed in prison.

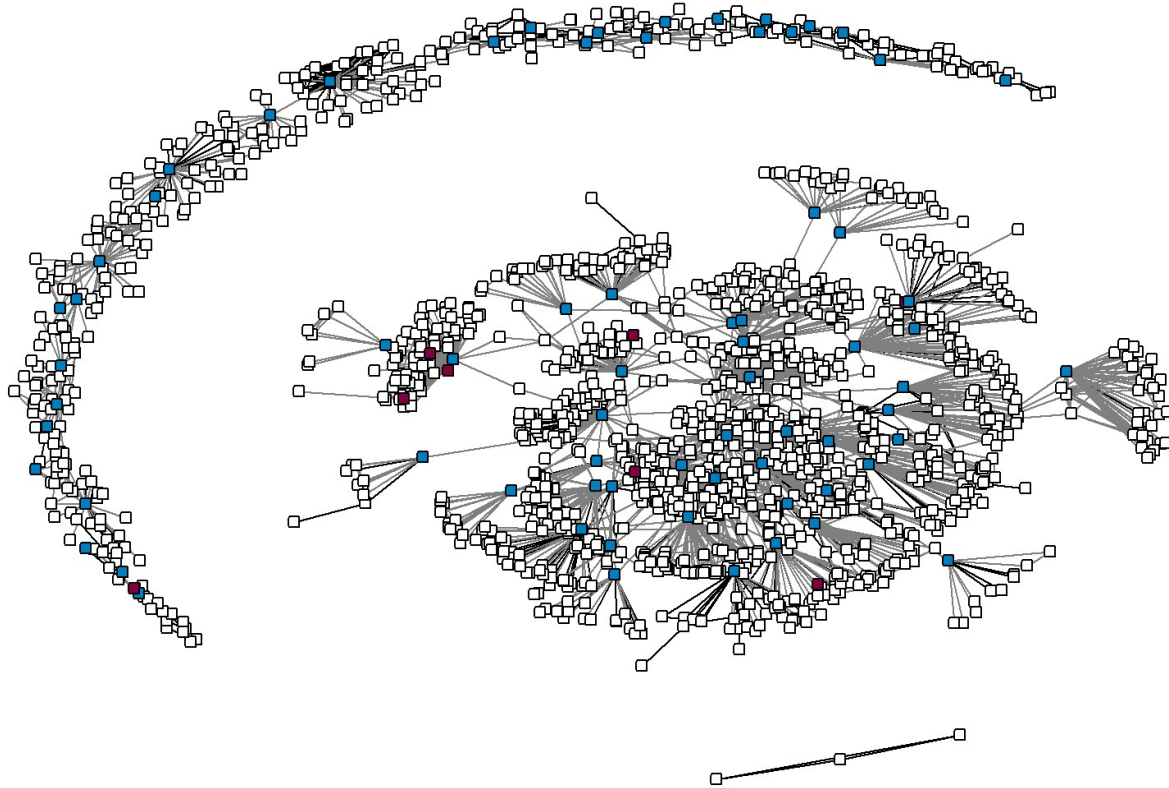


Figure 12. Prison and Community Criminogenic Social Network Structures of Homicide Offenders. Gray edges represent ties formed in prison. Black edges represent ties formed in the community. Blue nodes represent homicide offenders. Purple nodes represent non-homicide offenders from the ego networks of homicide offenders and white nodes represent the remaining alters from the ego networks of ISVYOS participants.

Overall, for the entire sample, prison appears to be an opportunity to gain acquaintances to crime-involved peers more so than in the community, at least based on official record data from CORNET. A person's status as a homicide offender may assist with their reputation in prison in ways that are less useful in the community. For example, in prison, gangs may value violence as a means of exerting control, intimidation, and protection. In communities, while violence may still be valued as part of the drug trade (e.g., debt collection), it may be counter-productive to certain lucrative-based offenses given the tendency for violence to draw attention of law enforcement. Importantly, from the start of the follow-up period through age 31, homicide offenders averaged approximately

⁵ Figure 11 shows that non-homicide offenders also experienced larger prison-based networks during the post-homicide follow-up period. However, the magnitude of difference was not as pronounced when compared against the difference for homicide offenders.

2,700 days in custody (also see Table 1). This was significantly more time spent in custody when compared to non-homicide offenders compared over the same time-period (approximately 1,200 days in custody). Accordingly, we investigated whether the greater number of prison ties for homicide offenders was simply a product of having more opportunity due to form ties. We did so by calculating total number of prison ties as a rate (i.e., average number of prison ties per day spent incarcerated). Homicide offenders still averaged a significantly larger prison network (i.e., .02 ties per day incarcerated compared to .01 ties per day incarcerated).

Section VI: A Brief Look into the Nature of Gang Involvement in Homicide Events

Figure 13 replicates the full network shown in Figure 2, but homicide events that were identified in CORNET are highlighted by the larger red edges. These ties include instances in which an offender was the victim of a homicide offense and not just instances where the ego perpetrated a homicide offense.

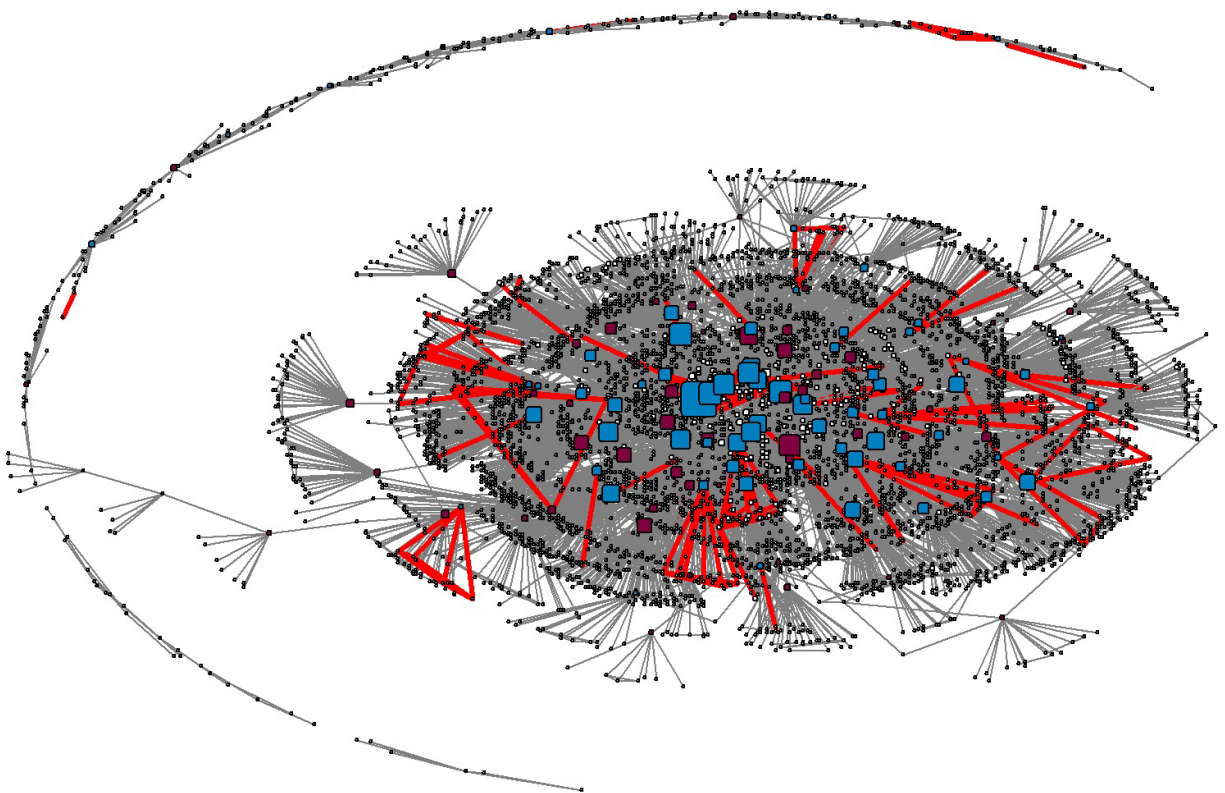


Figure 13. Full Network with Homicide Events Highlighted by Red Edges.

After extraction from the whole, the homicide events involved 137 individuals with 360 ties between them. Figure 14 shows the homicide events as networks. In all, the network included 38 components which represent just as many distinct networks. The whole networks metrics confirm what we see in that this is a very fragmented network (average

degree = 2.6; density = 1.9%; centralization = 7.7%), as most homicide-event based networks would be: this is, after all, a rare event that does not rely on a continuous flow of inter-connected relations to occur. The vast majority of these events happened in the community. Our data did contain one prison homicide, the murder of A3919 by the trio of S70, A3303 and A3621 (center of the graph). This was S70's second involvement in a homicide after he was convicted of manslaughter four years prior.

Almost half of the 38 components are simply dyads, one event involving two individuals. The largest had 14 individuals – 2 co-offenders and 12 on the victimization side (center right side of the graph). It was a home invasion robbery incident that turned into manslaughter, what prosecutors charged co-offenders S67 and A1789 with, for the incident. Not all these victims were killed in the incident, but all were present at the location where the robbery that resulted in death occurred. The second largest component involved 8 co-offenders involved in the murder of A352 that saw two of our seeds (S66 and S32) convicted for long sentences on their second murder (their first as adults). Some, like S150 (top middle of the graph), were found responsible for two separate murders (A2746 and A4697) but had no co-offenders.

We were curious as to whether gang membership would be factor in 1) the emergence of larger sub-networks around homicide events, and 2) one's involvement in multiple homicides. After all, gang members are sometimes involved in ongoing conflicts that force them to act upon, or retaliate to, external threats (whether or not these threats are aimed at a fellow member, or at them specifically). First, we did not find that the larger network components found in Figure 13 were gang-related events. None of the four largest components had seeds who were gang members. The largest gang-related network component was the network of S29 and his five accomplices (top right of the graph) involved in an attempted murder for the purpose of a criminal organization. As for involvement in multiple homicides, we found that only six of our seeds were involved in multiple events, including three who were also gang members (50%). Although this is too small a sample size for statistical tests or interpretations, other data support the idea that gang membership is an important driver of homicides more generally. For example, less than a quarter (24.5%) of the sample are gang members, but they make up for over one-third (36.7%) of the sample of homicide offenders. In fact, as many as 76.3% of the gang members in our data committed at least one homicide.

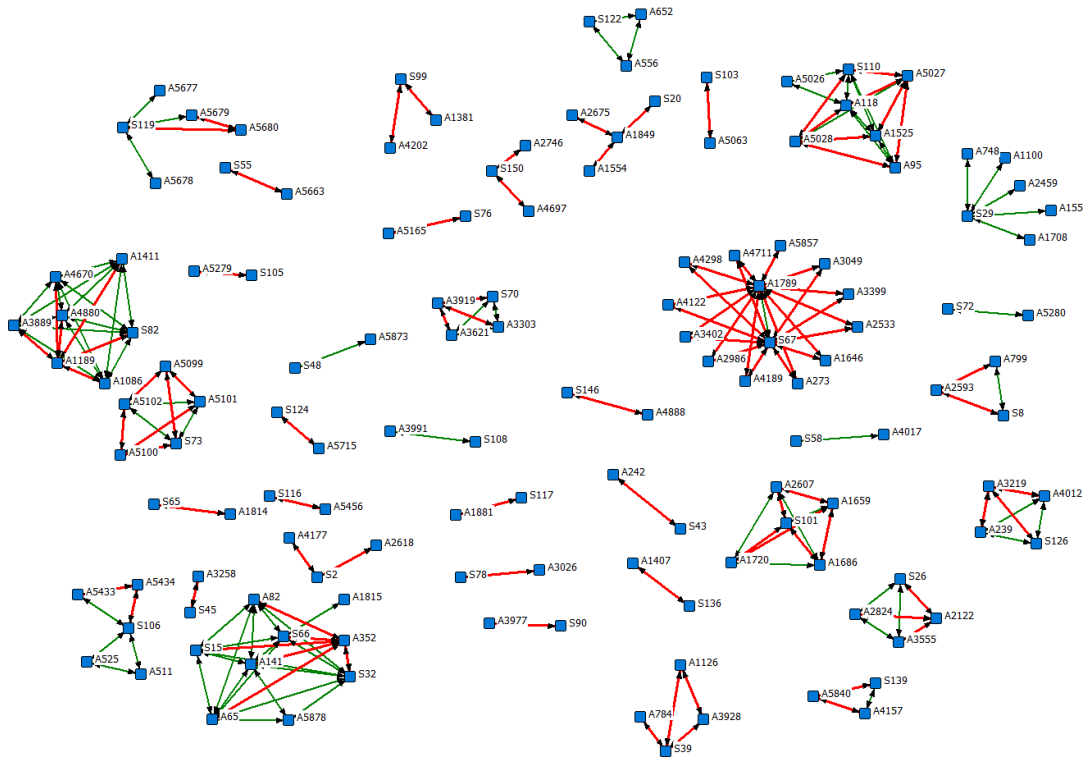


Figure 14. Network of Homicide Events. Homicide Events Highlighted by Red Edges, Green are Co-Offending or Positive Social Ties.

Section VII: Conclusion

Even when their homicide offence is not committed with the help of others, homicide offenders are not isolated. In fact, we found them to be involved in larger social networks than others. This is true before the homicide, and the story does not change after. And once incarcerated, homicide offenders continue to cultivate rich social networks in prison. Clearly, *lone wolf murderers*, to the extent that they exist, were under-represented in our data. Moreover, while gang members are disproportionately involved in homicide, it was not as if non-gang members were lone wolves either. Instead, homicides committed by this specific sample, whether gang-related or not, tended to occur against the backdrop of a much larger criminogenic social network. This could reflect the fact that all members of the sample engaged in criminal behavior in adolescence and there is a greater tendency for youth to commit their crimes with co-offenders (Moffitt, 1993). Thus, missing from this sample are, for example, the types of domestic violence cases resulting in homicides perpetrated by older men who have no prior criminal record. Combining our data with policing data more representative of all homicide offenses would help evaluate the generalizability of the findings from the current study. Unfortunately, we did not have access to such data.

The study was not designed to investigate as to why homicide offenders have larger networks than others. But prior research allows us to establish the grounds for a few working hypotheses that could be tested in future work. Because homicide offenders have larger networks than others even before they commit their first homicide, we can rule out explanations that would center solely around the social status that homicides may have provided them, after the fact. The first possible mechanism capitalizes on the inherently *social nature of conflicts*. Homicides are the most serious form of conflicts, and conflicts are social in that they always involve at least two individuals. And most often, conflicts emerge from social interactions with people we know, not strangers (Gould, 2003). It follows that, all else equal, the more people one knows, the more likely it is that conflicts emerge. The more conflicts that emerge, the more likely that at least some of these conflicts will result in death.

A second, related mechanism, recognizes that a non-trivial proportion of homicides involve gang members, and that gang membership may be, in and of itself, associated with both 1) larger social networks, and 2) involvement in lethal conflicts. Prior research suggests that gang members do not necessarily have larger friendship networks than others (Gallupe & Gravel, 2018; Reid & Maxson, 2016). Yet, recent research on BC gang networks showed that gang members tend to have slightly larger personal networks than others, a result that may be related to gang members' embeddedness in larger conflict networks (Corrado et al., 2019). We find this explanation plausible, especially for the 29 homicide offenders that were also gang members. Yet, this explanation cannot account for the similarly larger social networks of the majority of homicide offenders who were not gang members. These results opened up a few novel pathways for homicide research to focus on in the future.

Policy Implications

The finding that homicide offenders have larger, richer networks can be useful for law enforcement agencies and criminal justice personnel more generally. The number of conflictual ties is potentially one of the most robust predictors of future involvement in violence, including lethal violence. Policing and other agencies can use investigation data to code these conflictual ties in real time to provide up-to-date indications of persons at risk for homicide offenses. Moreover, our past research (e.g., Corrado et al., 2019; McCuish et al., 2015; McCuish, 2022; Ryu & McCuish, 2022) showed that conflict ties have important implications for involvement in other forms of offenses (e.g., firearms possession) as well as the risk of being a *victim* of a homicide offense. Accordingly, coding conflict ties has benefits beyond homicide investigations and the prevention of homicide offenses. The use of SNA has a track record of feasibility, reliability, and validity in BC police investigations of gang networks (e.g., Hainsworth, 2021).

Prior research on BC gang victims have shown that conflictual interactions were more frequent just prior to them being shot (Bains, 2021). Embeddedness in gang victim networks, especially in a brokerage role, is also a predictor of becoming a victim in the near future. Our results support this as well, confirming how important it is that

involvement in conflicts be monitored. Prevention of such conflicts is not only critical for immediately improving public safety but also because the experience of non-lethal victimization is a catalyst for becoming more criminally involved and developing a larger network. For example, using ISVYOS data, Ryu and McCuish (2022) found that after experiencing serious victimization, offenders tended to become more central in their criminogenic networks; they developed especially more co-offender ties and prison network ties. This possibly indicated that offenders were preparing to retaliate in response to their victimization. Proactive use of social networks is therefore a potentially useful tool, not just for preventing homicide offenses, but for in general developing ways of reducing crime and victimization.

Knowledge of the importance of social networks is only useful if combined with ways to prevent large criminogenic networks from developing or to effectively intervene so as to pull individuals out of a large criminogenic network. Focused deterrence interventions, for instance, often rely on network data to identify gang leaders and drivers of violence (Braga et al., 2019). The aim is to reduce violence by convincing these leaders and drivers of violence to change their behaviors, typically after having mounted a convincing case for a potential police operation on the group. The collection of network data, especially conflictual ties, is a central component of planning these interventions. Monitoring direct and indirect (i.e., via other peers) ties to conflict is important for understanding how homicide offenses emerge and how involvement in a homicide offense shapes a person's criminogenic network, especially in prison.

Other types of interventions such as duty to warn (Bains, 2021), gang exit support programs such as CFSEU-BC's Gang Intervention and Exiting Program⁶ could all be better supported using network data. Adding network data collection in schools and in prison would also provide some of the most relevant information needed in planning violence reduction interventions in these settings (Bouchard, 2021). In school settings, network data need not be used to identify criminogenic ties. Instead, positive peer social ties can be leveraged to identify peer leaders, to implement peer-led program strategies, and help develop more positive sources of informal social control that are well-known as protective factors against offending (Laub & Sampson, 2003).

Overall, this study is a powerful reminder of the importance of integrating SNA to routine criminal justice programming and interventions, from prevention efforts targeting at-risk youth, to the suppression efforts involved in policing gang and other conflicts. What does SNA offer that cannot be obtained from the use of traditional surveillance methods? SNA is useful for approaching the mapping of social ties systematically and objectively evaluating an offender's importance in criminal networks. SNA should be used to assist, rather than replace, other investigative strategies (Hashimi and Bouchard, 2017).

⁶ For more information, see [Gang Exiting and Intervention Team | End Gang Life: A Call to Action in British Columbia](#)

The power of social networks has been recognized in almost all aspects of human behavior, including criminal behavior. Social connections are a resource—or social capital—that people can utilize for benefits. When social capital is used in criminal endeavors, we refer to it as “criminal social capital”. Criminal social capital has been shown to be an important influence on criminal careers. Offenders who have higher criminal social capital tend to have higher illegal earnings (e.g., Morselli & Tremblay, 2004), avoid being arrested (e.g., Ouellet & Bouchard, 2017), and have longer criminal careers (Morselli, 2005). The fact that homicide offenders have higher criminal social capital is a novel finding, with uncertain implications for the field. One thing that is for certain is that homicide offenders are social beings who are more likely to be embedded in rich, sometimes conflict-laden social networks rather than be socially isolated. Recognizing and acting on this type of information would greatly benefit interventions and programs for people at risk of involvement in lethal violence.

References

- Bains, S. (2021). *Shots fired: Unraveling the 2015 Surrey gang conflict using social network analysis*. Masters thesis, Simon Fraser University.
- Beauregard, E., & Proulx, J. (2007). A classification of sexual homicide against men. *International Journal of Offender Therapy and Comparative Criminology*, 51(4), 420–432.
- Bender, L. (1959). Children and adolescents who have killed. *American Journal of Psychiatry*, 116, 510–513.
- Bolan, K. (2021). [Anatomy of a Metro Vancouver hit: Imported hit men, kill kits, guns and fast cars](#). *Vancouver Sun*.
- Borgatti, S. & Lopez-Kidwell, V. (2014). Network theory. In P. Carrington & J. Scott (Eds), *Handbook of Social Network Analysis*. Sage.
- Borgatti, S.P., Everett, M.G., & Freeman, L.C. (2002). *UCINET for Windows: Software for social network analysis*. Harvard, MA: Analytic Technologies.
- Borgatti, S.P., Everett, M., & Johnson, J. (2013). *Analyzing social networks*. London, England: Sage.
- Bouchard, M. (2020). Collaboration and boundaries in organized crime: A network perspective. *Crime and Justice*, 49(1), 425–469.
- Bouchard, M. (2021). Social networks and gangs: Moving research forward with low-cost data collection opportunities in school and prison settings. *Journal of Aggression, Conflict, and Peace Research*, 13:110–124.
- Bouchard, M., & Konarski, R. (2014). Assessing the core membership of a youth gang from its co-offending network. *Crime and networks*, 81–93.
- Bouchard, M., & Malm, A. (2016). Social network analysis and its contribution to research on crime and criminal justice. *Oxford Handbooks Online*.
- Braga, A.A., Zimmerman, G., Barao, L., Farrell, C., Brunson, R.K., & Papachristos, A.V. (2019). Street Gangs, Gun Violence, and Focused Deterrence: Comparing Place-based and Group-based Evaluation Methods to Estimate Direct and Spillover Deterrent Effects. *Journal of Research in Crime and Delinquency*, 56(4), 524–562.
- Burt, R. (1992). *Structural holes: The social structure of competition*. Harvard University Press.
- Corrado, R., McCuish, E., Bouchard, M. (2019). *Altering Pathways to Youth Gang Involvement and Violence: Building a Foundation for Evidence-Based Policy*. Ottawa: Public Safety Canada. 145 pages.
- DeLisi, M., Hochstetler, A., Jones-Johnson, G., Caudill, J.W., & Marquart, J.W. (2011). The road to murder: The enduring criminogenic effects of juvenile confinement among a sample of adult career criminals. *Youth Violence and Juvenile Justice*, 9(3), 207–221.
- DeLisi, M., Kosloski, A., Sween, M., Hachmeister, E., Moore, M., & Drury, A. (2010). Murder by numbers: Monetary costs imposed by a sample of homicide offenders. *Journal of Forensic Psychiatry and Psychology*, 21, 501–513.
- DeLisi, M., Piquero, A.R., & Cardwell, S.M. (2014). The unpredictability of murder juvenile homicide in the pathways to desistance study. *Youth Violence and Juvenile Justice*, 14, 26–42.

-
- Dobrin, A., Lee, D., & Price, J. (2005). Neighborhood structure differences between homicide victims and non-victims. *Journal of criminal justice*, 33(2), 137–143.
- Farrington, D.P., Loeber, R., & Berg, M.T. (2012). Young men who kill: A prospective longitudinal examination from childhood. *Homicide Studies*, 16, 99–128.
- Gallupe, O., Gravel, J. (2018). Social Network Position of Gang Members in Schools: Implications for Recruitment and Gang Prevention, *Justice Quarterly*, 35:3, 505–525.
- Gould, R.V. (2003). *Collision of Wills: How Ambiguity about Social Rank Breeds Conflict*. Chicago: University of Chicago Press.
- Hagan, M.P. (1997). An analysis of adolescent perpetrators of homicide and attempted homicide upon return to the community. *International Journal of Offender Therapy and Comparative Criminology*, 41, 250–259.
- Hainsworth, J. (2021). [Six alleged B.C. gang members charged in huge drug bust](#). *Pique News Magazine*.
- Hanneman, R.A., & Riddle, M. (2005). Introduction to social network methods. University of California, Riverside.
- Hashimi, S., Bouchard, M. (2017). On to the next one? Using social network data to inform police target prioritization. *Policing: An International Journal of Police Strategies & Management*, 40: 768–782.
- Haynie, D.L. (2001). Delinquent peers revisited: Does network structure matter? *American Journal of Sociology*, 106(4), 1013–1057.
- Heide, K. M. (2003). Youth homicide: A review of the literature and a blueprint for action. *International Journal of Offender Therapy and Comparative Criminology*, 47, 6–36.
- Heide, K.M., Spencer, E., Thompson, A., & Solomon, E.P. (2001). Who's in, who's out, and who's back: Follow-up data on 59 juveniles incarcerated in adult prison for murder or attempted murder in the early 1980s. *Behavioral Sciences & the Law*, 19, 97–108.
- Jones-Webb, R., & Wall, M. (2008). Neighborhood racial/ethnic concentration, social disadvantage, and homicide risk: an ecological analysis of 10 US cities. *Journal of Urban Health*, 85(5), 662–676.
- Knoke, D., & Yang, S. (2008). Network fundamentals. *Social Network Analysis*, 154, 3–14.
- Kubrin, C.E. (2003). Structural covariates of homicide rates: Does type of homicide matter? *Journal of Research in Crime and Delinquency*, 40(2), 139–170.
- Laub, J. & Sampson, R. (2003). *Shared beginnings, divergent lives: Delinquent boys to age 70*. Harvard University Press.
- Lin, N., Fu, Y.C., & Hsung, R.M. (2001). Measurement techniques for investigations of social capital. *Social capital: Theory and research*, 4, 57–81.
- Loeber, R., & Farrington, D.P. (2011). *Young homicide offenders and victims: Risk factors, prediction, and prevention from childhood*. New York, NY: Springer.
- Loeber, R., Pardini, D., Homish, D.L., Wei, E.H., Crawford, A.M., Farrington, D.P., Stouthamer-Loeber, M., Creemers, J., Koehler, S., & Rosenfeld, R. (2005). The prediction of violence and homicide in young men. *Journal of Consulting and Clinical Psychology*, 73, 1074–1088.
-

-
- McCarthy, B., & Hagan, J. (2001). When crime pays: Capital, competence, and criminal success. *Social Forces*, 79(3), 1035–1060.
- McCuish, E. (2022). Working from the outside in: Describing the criminogenic social network of a firearm offender. Report prepared for the Ministry of Public Safety and Solicitor General, Crime Reduction Research Program.
- McCuish, E.C., Bouchard, M., & Corrado, R.R. (2015). The search for suitable homicide co-offenders among gang members. *Journal of contemporary criminal justice*, 31(3), 319–336.
- McGloin, J.M., & Kirk, D.S. (2010). Social network analysis. In *Handbook of quantitative criminology* (pp. 209–224). Springer, New York, NY.
- Miller, D., & Looney, J. (1974). The prediction of adolescent homicide: Episodic dyscontrol and dehumanization. *American Journal of Psychoanalysis*, 34(3), 187–198.
- Morselli, C. (2003). Career opportunities and network-based privileges in the Cosa Nostra. *Crime, Law and Social Change*, 39(4), 383–418.
- Morselli, C. (2005). *Contacts, opportunities, and criminal enterprise*. Toronto, Ontario, Canada: University of Toronto Press.
- Morselli, C., & Tremblay, P. (2004). Criminal achievement, offender networks and the benefits of low self-control. *Criminology*, 42(3), 773–804.
- Morselli, C., Giguère, C., & Petit, K. (2007). The efficiency/security trade-off in criminal networks. *Social Networks*, 29, 143–153.
- Myers, W.C., Scott, K., Burgess, A.W., & Burgess, A.G. (1995). Psychopathology, biopsychosocial factors, crime characteristics, and classification of 25 homicidal youths. *Journal of the American Academy of Child & Adolescent Psychiatry*, 34, 1483–1489.
- Nieuwebeerta, P., McCall, P.L., Elffers, H., & Wittebrood, K. (2008). Neighborhood characteristics and individual homicide risks: Effects of social cohesion, confidence in the police, and socioeconomic disadvantage. *Homicide Studies*, 12(1), 90–116.
- Ouellet, F., & Bouchard, M. (2017). [Only a matter of time? The role of criminal competence in avoiding arrest](#). *Justice Quarterly*, 34: 699–726.
- Ouss, A. (2011). Prison as a school of crime: Evidence from cell-level interactions. *Available at SSRN 1989803*.
- Papachristos, A.V., Braga, A.A., Piza, E., & Grossman, L.S. (2015). The company you keep? The spillover effects of gang membership on individual gunshot victimization in a co-offending network. *Criminology*, 53(4), 624–649.
- Parker, K.F., & McCall, P.L. (1999). Structural conditions and racial homicide patterns: A look at the multiple disadvantages in urban areas. *Criminology*, 37(3), 447–478.
- Reid, S.E. & Maxson, C.L. (2016). Gang Youth and Friendship Networks in California Correctional Facilities: Examining Friendship Structure and Composition for Incarcerated Gang and Non-Gang Youth. In, C.L. Maxson & F-A. Esbensen (eds.), *Gang Transitions and Transformations in an International Context*, pp. 95–114. Springer International Publishing, Switzerland.
-

-
- Rodway, C., Norrington-Moore, V., While, D., Hunt, I.M., Flynn, S., Swinson, N., ... & Shaw, J. (2011). A population-based study of juvenile perpetrators of homicide in England and Wales. *Journal of adolescence*, 34(1), 19–28.
- Ryu, H., & McCuish, E. (2022). Exploring the Reciprocal Relationship Between Serious Victimization and Criminogenic Networks. *Canadian Journal of Criminology and Criminal Justice*, 64(2), 82–100.
- Smith, C.M., & Papachristos, A.V. (2022). Violence brokers and super-spreaders: how organised crime transformed the structure of Chicago violence during Prohibition. *Global Crime*, 23(1), 23–43.
- Tremblay, P. (1993). Searching for suitable co-offenders. *Routine activity and rational choice*, 5, 17–36.