



A Social Network Analysis of an MS-13 Network: Structure, Leadership Roles, and the Use of Confidential Informants

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Abstract

The current study focuses on a federal Racketeer Influenced and Corrupt Organizations Act indictment of MS-13 gang members who were charged based on a nine-and-a-half-year multi-agency investigation in Southern California. Using a social network analysis approach, the authors examine the relationship between crime types, shot-callers, and actor centrality metrics, and the importance and positioning of confidential informants (CIs) in gathering evidence and intelligence in large-scale gang investigations. Consistent with previous literature on the role of shot-callers, findings suggested the crime types murder/attempted murder are significantly related to those identified in the indictment and named as shot-callers. However, the centrality measures for shot-callers were not significantly different from those for other members. Finally, one particular CI played a significant role in the network, as s/he had the highest centrality measures. We also discuss implications for future research on CIs and their roles in evidence collection.

Keywords MS-13 · Shot-caller · Confidential informant · Social network

Introduction

Originating in California, MS-13 has constantly held a reputation for being extremely violent and territorial, engaging in numerous crimes ranging from narcotics trafficking to murder. Their multi-national reach and infiltration into politics and society make this street gang a threat to public safety and democracy. Previous studies have detected the structure of the MS-13 street gang and found variations in network structure and leadership. This study contributes to the existing literature on MS-13 and criminal networks by examining actors (including CIs), their roles, network positioning, and actor centrality measures using a social network approach, using data from a Racketeer Influenced and Corrupt Organizations Act (RICO) indictment of a faction of the notorious MS-13 street gang in Los Angeles, California. These data allow for the examination of specific features of the network configuration of the MS-13 gang and help address

previous issues associated with illicit networks regarding the use of confidential informants. Specifically, we examined the relationship between shot-caller, crime types, and actor centrality measures. Furthermore, we examined the role of CIs in the evidence collection process and their positioning in the network.

This article will proceed with the following sections: (1) a literature review on MS-13 history and leadership and an introduction to criminal network analysis, (2) a description of the data, the conceptualization of ties and crimes, and the coding process of converting the RICO indictment into usable social network metrics, (3) results from social network analysis, and (4) a discussion section including limitations and future research.

Literature Review

Mara Salvatrucha (MS-13) is a transnational street gang that originated in Los Angeles (Bunker & Sullivan, 2018; Rodgers & Baird, 2015). MS-13 is perhaps the most notorious transnational gang, operating in the Western Hemisphere and beyond (Velasquez, 2017). Transnational gangs have evolved into complex, networked entities that pose security threats in communities throughout North and Central America and

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into Europe (Bunker & Sullivan, 2018; Sullivan, 2008). MS-13 is the largest example of a “*mara*” or sophisticated street gang with evolved aims. Maras, such as MS-13 and its arch-rival 18th Street, are examples of third-generation street gangs (Sullivan, 2006a, 2006b; Franco, 2007). In that vein, “MS-13 is a distributed network comprised of interactive cliques (*clicas*) that operate with local autonomy and are subject to varying degrees of influence from other cliques in the network” (Bunker & Sullivan, 2018, p. 9). Scholars such as Rodgers and Baird (2015) argue that *mano duro* (hard hand government strategies) policies “pushed gangs” to become “more organized and less amateurish” (p. 483), though they argue that the impact of cartels entering Central America has the potential to “squeeze” gangs or “absorb” them in some cases (p. 483).

MS-13 is an interesting case in gang evolution. As mentioned above, it is an example of a “third-generation gang” which are evolved enterprises with mercenary and political dimensions. Sullivan first articulated the ‘third-generation gang’ typology in 1997 in an article at *Crime & Justice International* with an expanded version at *Transnational Organized Crime* (Sullivan, 1997). These papers were expanded in 2000 at *Small Wars & Insurgencies* (Sullivan, 2000). The article examined “the potential for gangs, transnational criminals, and terrorists to embrace network forms and utilize technology to wage netwar” (Sullivan, 2000, p. 82). In addition, the factors influencing “third-generation gang” organization (politicization, internationalization, and sophistication) were assessed to demonstrate the potential maturation processes of net-based threats (Sullivan, 2000).

The nature of gang “generations” in relation to networks was articulated in “Gangs, Hooligans, and Anarchists—The Vanguard of Netwar in the Streets” in 2001 (Sullivan, 2001). The three variables in describing gang generations are as follows: politicization, internationalization, and sophistication (Sullivan, 1997). In this schema, politicization involves the scope of political activity embraced by the gang; internationalization addresses the geospatial reach of the gang, while sophistication refers to the nature of gang activities (tactics, strategies) and organizational complexity (Sullivan, 2001). When initially articulated, the network attributes of gangs were largely understudied but over the years, Sullivan and his co-authors have built on that early foundation (Bunker & Sullivan, 2013; Sullivan & Bunker, 2007, 2012; Sullivan, 2020a). This article is part of that effort, enhancing the empirical understanding of gang networks.

MS-13 Origins

Specifically, the gang began in the Rampart and Pico-Union neighborhoods of Los Angeles in the 1980s (Arana, 2005; Dudley, 2020; Logan, 2009; Valdez, 2011; Zilberg, 2004). Its initial incarnation was known as the Mara Salvatrucha

Stoners (MSS). The name came from Salvadoran slang where “*mara*” meant gang based on the terms *la Marabunta* (i.e., roaring ants), meaning comrades protecting each other like ants, and *Salvatrucha* meaning “street smart Salvadorans” (Bunker & Sullivan, 2018, p. 9). The “13” connotes fealty to *La Eme* (the Mexican Mafia), a Southern California prison gang (since “M” is the 13th letter in the alphabet and is used to represent Eme) (Bunker & Sullivan, 2013, 2018; Valdez, 2011, p. 30). MS-13 was initially established for self-protection from local gangs (especially their rival 18th Street). In this vein, they started as a turf gang (or first-generation gang), and as they interacted with other entities (like *La Eme*), they morphed into a “second-generation” (market) gang and ultimately into a “third-generation” transnational networked enterprise (Sullivan, 2008; Valdez, 2011). Some scholars such as Rodgers and Baird (2015) citing Jütersonke et al., (2009, p. 380) have questioned the transnational character of MS-13 and *maras*, while acknowledging that gang members migrate (p. 492).

MS-13 now operates in the Los Angeles region, along the Eastern seaboard in the National Capital Region—Washington, DC, Maryland, and Northern Virginia (NoVA), North Carolina, Long Island (New York), Texas, and notably in El Salvador, Honduras, and Guatemala in the Northern Triangle of Central America (NTCA). The Northern Triangle is now one of the major MS-13 centers of power and influence due to the deportation of violent alien felons from the United States to El Salvador and the adjoining nations of the NTCA (Bunker & Sullivan, 2018, p. 10; Wolf, 2010; Arana, 2005; Zilberg, 2004). Zilberg (2004) points out that this is an impact of globalization and “forced transnationality” as the US enforces its “nationalism” (p. 762). Recent scholarship by Correa-Cabrera et al., (2023) argues that MS-13 in the NOVA is organized differently than in the NTCA where it often fills state vacuums. Indeed, Rosen and Cruz (2022) demonstrate through extensive interviews that NGOs cannot simply ignore these gangs when trying to operate in areas they control. Correa-Cabrera et al (2023) acknowledge that MS-13 organizational structures may be different in other regions, especially the west coast where the Mexican Mafia is present, and the study presented here is thus a useful test case to assess the structures of MS-13 in Los Angeles.

According to the Congressional Research Service:

The Mara Salvatrucha (MS-13) is a violent criminal gang operating both in the United States and abroad—namely Central America. MS-13 was formed on the streets of Los Angeles, CA, in the 1980s by refugees who were fleeing civil conflict in El Salvador. It became a transnational gang as MS-13 members who were deported from the United States to Central America helped establish gang ties and spread U.S. gang culture abroad (Finklea, 2018, p. 1).

Texas designates MS-13, with an estimated 600–1,000 members in the state (Texas Department of Public Safety, 2015), as a “Tier 1 gang due to its relationships with Mexican cartels (cross-border links), high levels of criminal activity, high levels of violence, and overall statewide presence” (Bunker & Sullivan, 2018, p. 10). The exact total strength of the network is unknown. However, it is estimated to possess between 50,000 and 70,000 members globally, with 8,000 and 10,000 believed to reside in the United States, and the remainder primarily in El Salvador and the rest of the NTCA (Bunker & Sullivan, 2018). In 2018, Bunker and Sullivan estimated that MS-13 had up to 368 cliques in El Salvador versus approximately 20 in Los Angeles, another 100 or so in Honduras and Guatemala, and 50 cliques on the eastern seaboard from DC to New York (Bunker & Sullivan, 2018). Additional MS-13 presence is reported in 42 US states, Mexico, Canada, Spain (especially Catalonia), and Italy (Bunker & Sullivan, 2018; Sullivan & Logan, 2010).

Network Presence and Leadership

MS-13 is organized into a series of distributed, interconnected *clicas*. These individual cliques are primarily clustered in Los Angeles (the original cluster), Northern Virginia (NoVA, including DC, Maryland, and Virginia), and Central America (El Salvador and the NTCA), with smaller clusters in Texas and New York (Farah & Babineau, 2017). The overall network—framed as “the Bloody Triangle” (Sullivan & Logan, 2010)—is characterized by “a ‘hierarchy of respect’ expressed through a web of social relationships and influence within individual cliques and social/business relationships between cliques” (Bunker & Sullivan, 2018, p. 10; Sullivan & Logan, 2010). MS-13 leadership is guided by a common ethos: “*mata, controla, viola*” (kill, control, rape) (Bunker & Sullivan, 2018, p. 10; Sullivan & Logan, 2010). Its networked organizational structure relies on a “‘hierarchy of influence’ where ‘respect’ and loyalties are expressed through a networked structure” (Bunker & Sullivan, 2018, p. 10; Sullivan & Logan, 2010).

Regional variation in internal structure exists (Bunker & Sullivan, 2019; Correa-Cabrera et al., 2023). For example, in El Salvador, the gang has embraced a hierarchical expression of network structure, with leadership known as *ranfleros*, collaborators known as *paros*, and programs which are clusters of cliques and two primary leaders in each clique known as *primera palabra* and *segunda palabra* (first and second word) (Bunker & Sullivan, 2018, p. 10). Scholars such as Correa-Cabrera have pointed to organizational differences between MS-13 in El Salvador (more hierarchical) and the less hierarchical MS-13 in Northern Virginia (Correa-Cabrera et al., 2023). MS-13’s flatter structure with non-specialized roles reduces its

overall sophistication and increases its vulnerability to informants (Dudley & Silva Ávalos, 2018, p. 37).

The existing literature has clear definitions of relevant terms for this analysis related to structure and the enforcement of gang rules. To enforce gang rules in Central America, the literature shows that MS-13 can issue a “Luz verde” or “green light” which is “an order to kill on sight” (Dudley, 2020, p. 30). Other gangs also issue green lights and MSS members once had green lights issued by the Mexican Mafia against them prior to their alliance (Valdez, 2011, p. 28). Shot-caller is another common term in the literature, which refers to a gang leader, typically in prison (Trammell, 2009; Valdez, 2011, p. 35). As Trammell describes “interviewees described leaders, called shot-callers, who control illegal businesses such as the drug trade. They use violence to control their own gangs in order to reduce the chance of riots” (Trammell, 2009, pp. 748, 749). Trammel (2009) explains that the term originated with “the Mexican Mafia in the 1950s,” but has become “common to most” street and prison gangs (p. 759).

Gangs, like other criminal enterprises, gain enhanced sophistication from contact and interaction with more sophisticated criminal entities (Jones, 2021; Sullivan, 2020b). This is significant because it helps gangs move from one “generation” to the next and expands their reach and potency. As mentioned above, MS-13 has links to the Mexican Mafia (Eme) in Los Angeles, but it has also interacted and allied with Los Zetas, a Mexican cartel (García, 2023; Sullivan & Elkus, 2012). MS-13 continues to evolve, yet its “neo-feudal structure makes it malleable to shifting alliances, rivalries, and opportunities” which include prison gangs (García, 2023; Sullivan & Logan, 2010, p. 54).

MS-13 has clearly evolved political dimensions, has deep interconnections with corrupt politicians, and challenges state capacity and legitimacy—collectively, solvency (Sullivan, 2013). In El Salvador, for example, over 50,000 gang members and *mareros* from MS-13 and its rivals (*Sureños*, Barrio 18, and *Revolucionarios*) have been arrested by the government during a 5-month state of emergency slated to end on September 20, 2022 (Madureira, 2022; Marcy, 2023, p. 279, 280). Pamela Ruiz (2023) describes the suspension of constitutional rights, to crackdown on gangs in Honduras in 2022 and 2023. These crackdowns demonstrate the complexity of containing and controlling networked gang activity when it competes with states (Sullivan, 2012). Building a better understanding of network dynamics is essential to addressing the threat and calibrating effective responses. The next section describes social network analysis (SNA) as a tool and discusses the pertinent SNA literature.

Criminal Network Analysis Literature

Social network analysis (SNA) has become an increasingly important aspect of criminological analysis. Over the last two decades, there has been a dramatic increase in criminal network analysis which applies SNA concepts to criminal networks (Everton, 2012; Sparrow, 1991). The application of SNA to criminology and security studies has become so ubiquitous that many scholars have developed SNA textbooks for intelligence practitioners, broadly (Cunningham et al., 2016; Everton, 2012) building upon previous work in sociology (Wasserman & Faust, 1994). Gisela Bichler has recently written a textbook expressly for criminal network analysis (Bichler, 2019). Three aspects of the criminal network analysis literature are important here: (1) SNA with court records, (2) structural features of illicit networks' increasing resilience, and (3) the analysis of centrality in the context of actor attributes and roles.

Criminal Network Analysis and Court Documents

The first key component of the criminal network analysis literature for this project is the use of court documents for relational data in social network analysis. The use of court documents is an assessment of unstructured data, which involve the manual coding of data into a useful dataset for social network analysis, as we will describe in the methods section. Numerous scholars pioneered this research, including Mangai Natarajan, who used New York court records to assess a heroin trafficking network, and Carlo Morselli's various studies, including those on the Hell's Angels, a sex trafficking network and marijuana smuggling empire (Morselli, 2001, 2009; Morselli & Savoie-Gargiso, 2014; Natarajan, 2000, 2006). Here, qualitative knowledge of the network itself, gleaned when a human reads and interprets the data or ethnography, increases the validity of the data, as Kenney and Coulthart argue (Kenney & Coulthart, 2015).

No dataset is perfect, however. Berlusconi (2014) conducted an impressive study comparing arrest warrant, wiretap, and sentencing SNA data. She found that while arrest warrant data were likely to miss some ties contained in the wiretap data, they served as a purposive sample of the prosecution's case, and key players were unlikely to be left out (Berlusconi, 2014; Bichler, 2019). This research was used by Jones et al. (2020) in the social network analysis of the Fernando Sanchez Organization (Tijuana Cartel) based on indictment and wiretap application documents (Jones et al., 2020).

Numerous scholars have since used court documents and open-source materials in conjunction with court records to build criminal networks. These include analyses of Genaro Garcia Luna's criminal network, involving corruption in the Mexican government, where he was head of security

from 2006 to 2012 (Sollano Jr, 2022), illicit hydrocarbon networks in Mexico (Salcedo-Albaran & Garay Salamanca, 2014), money laundering networks and organized crime (Jacopo, 2022), and several others. Scholars have also used datasets built by private companies from court records and open-source materials to assess the alliance structures of illicit networks (Jones et al., 2022). Scholars such as Carpenter and Cooper (2015) have applied SNA to gangs and their transnational ties in alliance and rivalry networks, as have others such as Radil and Tita (Carpenter & Cooper, 2015; Radil et al., 2010; Tita & Radil, 2011).

Scholars have created a sufficient body of SNA literature using court documents that a literature review of the methodological issues has been conducted (Bright et al., 2015). The authors identified numerous methodological issues self-identified by scholars in the literature, which included the following: (1) "validity," (2) "generalizability," (3) missing data, (4) "negotiating access," (5) "ascribing boundaries," (6) ethics, and (7) "defining ties" (Bright et al., 2021, pp. 59–63). Despite the issues raised by scholars, the use of law enforcement and court documents in SNA has many advantages, including that trustworthy data prosecutors themselves believe they can prove or have proven efficient use in a court of law. Faust and Tita (2019) believe that SNA tools will become a standard research tool in criminology.

Network Characteristics and Resilience

Numerous scholars such as Ayling (2009) have pointed to the role of network characteristics of criminal organizations to explain their resilience (Ayling, 2009; Jones et al., 2020; Bakker et al., 2012). Resilience is generally defined in this literature in an organizational fashion as the ability to bounce back from a disruptive event and also to adapt to take advantage of adversity (Ayling, 2009, p. 185). Fabiani and Behlendorf (2021) describe how a Chinese human smuggling ring, the "Sister Ping" network, responded poorly to repeated disruption by becoming more interdependent and increasing commitments, leading to more vulnerability.

Michael Kenney has discussed the role of compartmentalization in the organizational structure of networks and how this helps to make them resilient (Kenney, 2007; Arquilla and Ronfeldt, 2001). By compartmentalizing operations, the arrest of one cell/individual, for example, does not lead to the complete collapse of the network. Morselli et al (2007) discussed the tradeoffs between security and efficiency in illicit networks. Illicit networks may trade efficiency for increased security by compartmentalizing operations, protecting important individuals via proxies, et cetera. Morselli et al (2007) using Krebs (2002) research on Al Qaeda argued that criminal networks have shorter time to criminal acts than ideologically driven terror networks.

Redundancy is another organizational network characteristic that can minimize the impact of law enforcement operations against gangs (Ayling, 2009, p. 189, 190). Ayling (2009) discusses the role of “loose coupling” wherein gangs like MS-13 may have densely connected cliques “connected by loose couplings” (Ayling, 2009, p. 190; Williams, 2001).

Roles and Positions in Criminal Network Analysis

The third major component of the social network analysis literature relevant to this project relates to the specific types of SNA in which scholars assess roles, positions, and attributes of network actors in relation to their centrality (Bright et al., 2015). Some of the earliest work in this area was conducted by Baker and Faulkner in the context of an illegal conspiracy in the electrical industry (Baker & Faulkner, 1993). Later, Carlo Morselli would look at positions and vulnerabilities in illicit networks (Morselli, 2010).

Bright and colleagues (2015) build upon the research of Calderoni (2014) and Schwartz and Rouselle (2009), which considers not just the centrality of an actor, but their roles, resources, and attributes or “network capital.” They create an overall attribute weight, which can be used in conjunction with centrality scores to identify key players. Bright et al. (2015) found that assessing these other factors and moving beyond centrality to identify key players is an important strategy that can increase validity in the study of criminal networks and assist law enforcement in their efforts.

More recent scholarship has built upon this research to study the roles and positions of women in a Canadian organized crime network in relation to their centrality. This study found persistent inequality within organized crime based on gender, with women having reduced access to resources, poor network positioning, and dependence on male intermediaries (Diviák et al., 2020).

Jones and colleagues (2020) also assess the organizational roles, actor position, and the importance of confident informants among a faction of a transnational Mexican drug trafficking organization (Fernando Sanchez organization). Findings showed that narcotics distributors, drug couriers, and enforcers within the network had higher centrality measures (degree, betweenness, and eigenvector centrality) (Jones et al., 2020). The same study also found that most CIs within the network had high degree centrality (Jones et al., 2020), which is consistent with previous studies in that SNA on criminal networks often show law enforcement biases and legal strategies for investigations and prosecution (Morselli et al., 2007; Natarajan, 2000, 2006; Von Lampe, 2009). Furthermore, Jones and colleagues (2020) found that the leader in the network insulated himself from the network because he had very few ties compared to lower ranked individuals within the network, suggesting that leaders are periphery actors.

Smith and Papachristos (2022) use violence data from prohibition era Chicago to demonstrate that there were violence super spreaders: individuals who connected major violent events and were thus positioned in the violence network as brokers. Smith and Papachristos’ (2022) research is particularly relevant as we assess the role of key players such as “shot-callers” in relation to network position and violence via murder and attempted murder. Contrary to their findings, this study found no correlation between shot-callers and higher centrality. This may be a function of coding this network as an operational versus conflict network. In an operational network, drug trafficking requires more contacts on a regular basis, increasing the centrality of actors over those who insulate themselves and order murders.

Informed by these previous studies and driven by the methods of Jones and colleagues (2020), the following research questions are addressed: (1) what is the relationship between shot-callers and crime types? (2) What is the relationship between shot-callers and centrality measures after controlling for crime types? And (3) what is the positioning of confidential informants in the network, and what role did they play in evidence collection?

Methods

Data

The data for the current study come from a 2016 Grand Jury Indictment out of the Central District Court of California. This 127-page-indictment is based on a multi-agency, multi-year (approximately 9.5 years) investigation into MS-13 cliques in Los Angeles charged with crimes under the RICO statute. The evidence for overt acts included in the indictment comes from undercover law enforcement, wiretap transcripts, and CIs. This indictment identifies 41 actors, eight of whom were CIs (CHS-1 through CHS-8) and the 33 indicted MS-13 members (P1 through P33). All the names mentioned in the indictment have been de-identified in this study. It is important to note that an indictment is simply an allegation of criminal acts based on evidence collected. Individuals mentioned in this indictment are innocent until proven guilty in a court of law or an admission of guilt is entered on behalf of the defendant in a court of law.

Conceptualization of Ties and Attributes

In identifying ties among actors in the network, the authors relied on the 324 overt acts described in the indictment. Under the RICO statute, an overt act includes not only the commission of a crime but also the planning, verbal agreement, or association with crimes committed on behalf of the enterprise. Given the nature of RICO indictments in

Table 1 Conceptualization of attributes for analysis

Variables	Conceptualization
Murder/attempted murder	Ordering, planning, engaging, or association by name with a successful murder or an attempted murder
Extortion	Collecting, ordering, or maintaining the collection of money from a street vendor/business or “rent”/“tax” from a clique or members of a clique, sending extortion monies, collecting debts
Narcotics trafficking	Ordering, planning, engaging, or association by name with narcotics trafficking
Weapon procurement	Ordering, planning, buying, selling, or associated by name with an event involving procuring a weapon
Assault	Ordering, planning, engaging, or association by name with an “actual” or “threat” of physical assault against a member, non-member, or citizen; includes “jumping-in” and discussion of disciplinary actions
Shot-caller	Named in the indictment as being a shot-caller*

*Shot-callers are considered the leaders of cliques and dictate much of the criminal activities, especially serious crimes. They are also responsible for communicating with other clique shot-callers to discuss common goals and settle disputes between cliques

how they specify crimes and actor involvement, overt acts were used to identify operational connections/ties between actors (Jones et al., 2020). This illicit network is considered an operational criminal network, which is a sub-category of a co-offender network. An attribute list was developed based on the crime types or illegal actions committed in the indictment per overt act, which included ordering, planning, engaging, knowledge of, or association by name with crimes mentioned in each overt act. All four researchers assessed and approved the conceptualization of the attributes prior to coding. All crime types, illegal acts, and individual operational characteristics were initially conceptualized and coded in the attribute list. For the purposes of the current study, only five types of crime were included: murder/attempted murder, extortion, narcotics trafficking, weapon procurement, and assault,¹ and whether an individual was identified by law enforcement as a shot-caller. See Table 1 for the conceptualization of the five crime types and how we defined a shot-caller. The original attribute table, created in Excel, contained the frequency of each criminal act committed per overt act and for each actor included.

Coding of Attribute Table and Edge List

Two researchers simultaneously coded an attribute table and an edge list and agreed upon each tie and attribute count to be included in the tables. Individuals were coded in the attribute table as involved in a crime type when mentioned by name in an overt act. In instances where more than one crime was mentioned within an overt act, only individuals

¹ Many crime types were omitted from the current study because only very few of the actors committed the crime type, which means these variables have extremely low variation leading to low statistic power for the analysis. Some other crime types were omitted because they were similar to the more serious type of crimes that were included in the current analysis. For instance, we included narcotic trafficking but omitted drug possession but no sale.

Table 2 Descriptive on attributes ($N=41$)

Variables	<i>n</i> (%)
Murder/attempted murder	19 (46%)
Extortion	17 (41%)
Narcotics trafficking	21 (51%)
Weapon procurement	17 (41%)
Assault	18 (44%)
Shot-caller	7 (17%)

that fit the conceptualization for that crime were coded in the attribute table. Although 18 attributes (overt acts included in the indictment) were coded for the entire network, for the purpose of this study, Table 2 presents only the descriptive statistics for the six attributes included in the analysis.² Nineteen (46%) of the actors committed or were involved in at least one murder/attempted murder. Seventeen (41%) of the actors extorted at least one time. Twenty-one (51%) of the actors trafficked narcotics. Seventeen (41%) of the actors procured weapons. Eighteen (44%) of the actors committed at least one assault. Seven (17%) actors were identified as shot-callers in the indictment.

An edge list was created in Excel that included ties among actors involved in these conceptualized crimes per overt act. For the ties that were repeated in different overt acts among actors, a tie was still counted in the edge list for the purpose of capturing the strength of ties. In instances where three or more individuals were involved in a particular criminal act, the edge list captured the maximum possible ties. For instance, if P1, P2, and P3 trafficked an ounce of methamphetamine, a tie was created between P1 and P2, P1 and P3, and P2 and P3. When an overt act only included one identifiable actor involved in a crime/s, the individual was

² Other attributes that were not included in the analysis are presented in the Appendix A.

coded in the attribute table for the crime/s but not in the edge list because the other individual/s were not identified by name (e.g., “an unindicted individual”) or the individual committed the act by themselves. In instances where actors included in the overt act were not named in the indictment, these unnamed and thus unidentifiable individuals were not coded for in either the attribute table or the edge list.

Analytical Strategies

The Excel spreadsheets of the attribute table and edge list were transferred to UCINET v. 6.746 (Borgatti et al., 2002) to run social network regression models and to Gephi 0.9.7 (Bastian et al., 2009) for the network visualization. Three normalized centrality measures were computed in UCINET, including degree, betweenness, and eigenvector centrality (Bichler et al., 2017). All three network measurements were computed with duplicate/weighted ties. Degree centrality measures the frequency of ties each actor has in the network. Betweenness centrality is a way of determining the amount of influence an actor has on the flow of information in a network. Eigenvector centrality measures the summed connections to others, weighted by their centralities, which takes into consideration the centrality of an actor and the centrality of that actor’s contacts. Higher values of each centrality measure indicate a more centralized position within the network.

Four social network regressions were estimated. For each social network regression, a permutation test was included in UCINET, which randomized the centrality measure of each actor 10,000 times, to counter the issue of self-correlation among social network data (Everton, 2012). The first model tested whether being a shot-caller was associated with involvement in the five crime types of interest. The other three models estimated if actor degree, betweenness, and eigenvector centrality (DVs) were related to the five dichotomized crime types and being a shot-caller (IVs).³

Results

The overall density⁴ of the MS-13 network ($N=41$) is 0.17, with 142 total ties without weight and 438 total ties with weight. Table 3 displays each actor’s centrality measures with weighted ties, where P1 to P33 indict MS-13 members, CHS-1 to CHS-8 are CIs, and shot-callers are identified

Table 3 Descriptive of actors’ centrality measures

Actors	Degree	Betweenness	Eigen-vector Centrality
P1	5	0	0.001
P2	19	18.322	0.011
P3	19	2.854	0.202
P4	6	39	0.002
P5	6	0	0.070
P6	32	3.337	0.257
P7	38	96.169	0.086
P8	4	0	0.012
P9	2	0	0
P10	25	0	0.267
P11*	33	6.562	0.138
P12*	53	36.433	0.176
P13*	37	6.562	0.130
P14*	57	104.88	0.328
P15	9	0	0.055
P16	8	0	0.004
P17*	13	26.057	0.064
P18	1	0	0
P19	45	75.951	0.206
P20*	32	39.236	0.103
P21	16	2.057	0.110
P22	3	76	0.018
P23	24	95.798	0.030
P24	21	0	0.182
P25	15	4.558	0.038
P26	13	0.949	0.029
P27	15	6.444	0.006
P28	11	0.827	0.025
P29	13	6.413	0.009
P30	39	210.179	0.102
P31	8	0	0.002
P32	32	3.492	0.288
P33	17	0	0.057
CHS-1	168	224.032	0.654
CHS-2	3	39	0
CHS-3	3	0	0.001
CHS-4	10	2.554	0.013
CHS-5	1	0	0.001
CHS-6	13	1.333	0.014
CHS-7	4	0	0.002
CHS-8	3	0	0.006

P represents individual indicted actors, while CHS represents CI

*Identifies actors mentioned in the indictment as shot-callers

Degree and betweenness are not standardized measures

³ The crime types from the attribute table were dichotomized in the analysis because there were actors who were extreme outliers when frequency was taken into account.

⁴ Network density is defined as the number of ties over the number of possible ties.

Table 4 Regression on being a shot-caller

Variables	b	se	p-value
Murder/attempted murder	0.28*	0.13	0.05
Extortion	0.15	0.13	0.26
Narcotics trafficking	0.05	0.13	0.70
Weapon procurement	− 0.10	0.14	0.49
Assault	0.13	0.13	0.34

* $p < 0.05$, $R^2 = 0.21$

with an asterisk. CHS-1 had the highest degree centrality (168), the highest betweenness centrality (224.032), and the highest eigenvector centrality (0.654). In response to Jones and colleagues' (2020) call for further examination into the importance of CIs within criminal networks, the current findings indicate that based on this RICO indictment, a CI also plays a major role in the network of a street gang as well, at least for the purpose of evidence collection included in an indictment.

Table 4 presents the results of research question one, regarding the relationship between shot-caller status and the five crime types of interest. Murder/attempted murder ($b = 0.28$; $p = 0.05$) is positively related to whether an actor is a shot-caller. However, extortion ($p = 0.26$), narcotics trafficking ($p = 0.70$), weapon procurement ($p = 0.49$), and assault ($p = 0.34$) are not significantly related to being a shot-caller. This finding is in line with Sullivan and Logan (2010), stating that shot-callers are mostly involved in coordinating the most severe crimes, in this case, murder/attempted murder. It is also consistent with the findings from drug cartel leadership studies, which argue that the position of the leadership of drug cartels is peripheral (Jones et al., 2020).

Table 5 displays the results of research question two, regarding how shot-callers' centrality measures differed from those not identified as shot-callers after controlling for the five crime types. Shot-callers are not significantly related to any of the three centrality measures ($p_{degree} = 0.32$; $p_{betweenness} = 0.35$; $p_{eigenvector} = 0.13$). Engaging in murder/attempted murder is not significantly related to any centrality measures

($p_{degree} = 0.87$; $p_{betweenness} = 0.34$; $p_{eigenvector} = 0.61$). Actors who were engaged in narcotics trafficking had significant and consistent higher values of degree centrality ($b = 23.38$; $p = 0.01$), betweenness centrality ($b = 43.10$; $p = 0.02$), and eigenvector centrality ($b = 0.09$; $p = 0.05$) than those actors who were not engaged in narcotics trafficking. This finding regarding the MS-13 street gang is consistent with Jones and colleagues' (2020) study of a Mexican drug cartel network and suggests that actors who are engaged in narcotics trafficking are in more central positions in the network and have significant and higher centrality measure values compared to their counterparts who do not engage in narcotics trafficking. This finding may also suggest that compartmentation is occurring for shot-callers to protect them from detection by law enforcement. Additionally, actors who were involved in extortion had significantly lower values of degree centrality compared to those who did not engage in extortion ($b = -19.39$; $p = 0.04$). This finding suggests that actors responsible for extortion were not central to the network and did not have as many operational ties with other members compared to those who did not engage in extortion. Neither weapon procurement ($p_{degree} = 0.08$; $p_{betweenness} = 0.27$; $p_{eigenvector} = 0.06$) nor assault ($p_{degree} = 0.09$; $p_{betweenness} = 0.23$; $p_{eigenvector} = 0.08$) was significantly related to any of the centrality measures.

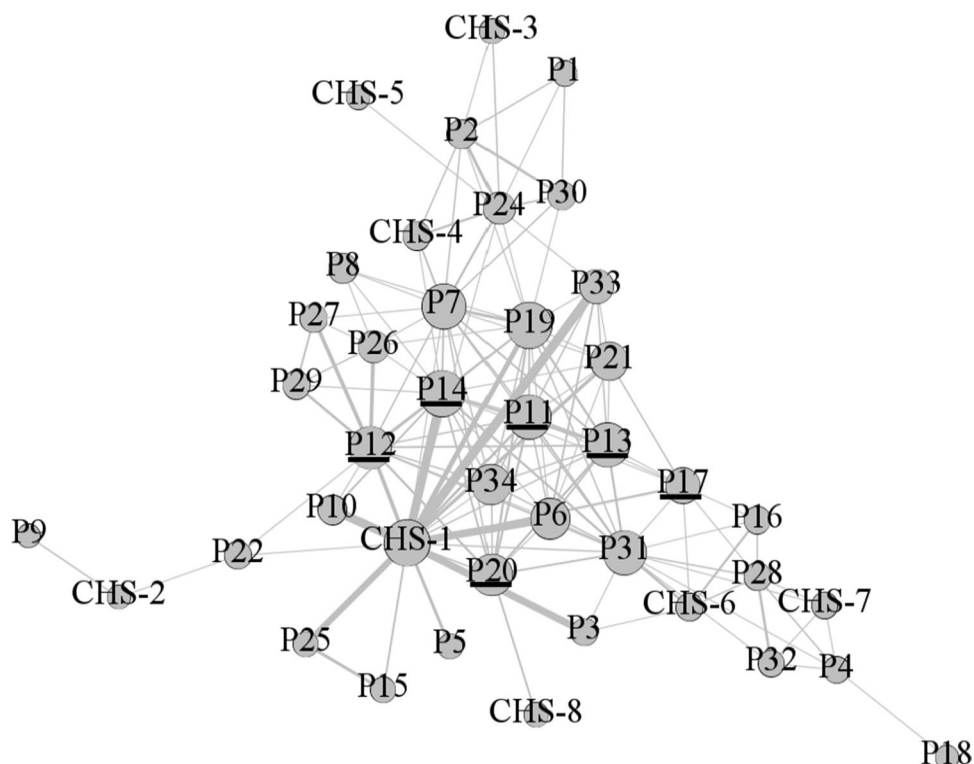
Figure 1 is created in Gephi using the edge list and displays the MS-13 network visualization. This figure helps visualize the network and addresses research question three, regarding the unique position of CHS-1. This visualization also highlights the positioning of shot-callers in the network. The size of the nodes represents the eigenvector centrality of each actor, and the width of the ties represents the frequency of each tie being mentioned in the indictment. As previously mentioned in Table 3, CHS-1 had the highest degree and betweenness centrality in the network, which suggests that this CI had the most operational ties and was in a considerable position of control over the flow of communication or, in this instance, operational actions. CHS-1 also ranked the highest in eigenvector centrality, suggesting that s/he not only had a high number of ties, but those whom s/he had ties with were typically more central to the network. In other

Table 5 Regression on centrality measures

Variables	Degree			Betweenness			Eigenvector centrality		
	b	se	p	b	se	p	b	se	p
Murder/attempted murder	− 1.56	9.99	0.87	− 19.46	19.76	0.34	− 0.03	0.05	0.61
Extortion	− 19.39*	9.50	0.04	− 23.20	18.80	0.24	− 0.06	0.04	0.20
Narcotics trafficking	23.38*	9.15	0.01	43.10*	18.10	0.02	0.09*	0.04	0.05
Weapon procurement	18.07	9.97	0.08	22.49	19.72	0.27	0.09	0.05	0.06
Assault	15.94	9.23	0.09	22.63	18.38	0.23	0.08	0.04	0.08
Shot-caller	− 11.51	11.99	0.32	− 22.82	23.73	0.35	− 0.09	0.06	0.13
R^2	0.27			0.21			0.27		

* $p < 0.05$

Fig. 1 Full Network of MS-13 indicted group. Nodes are sized on Eigenvector centrality. The width of ties is sized on the frequency of each tie being mentioned in the indictment. Shot-callers are identified with an underline



words, CHS-1 was not only highly connected, but the actors that CHS-1 had connections with were also highly central. Overall, CHS-1 accounted for 38 percent (168 out of 438) of the operational ties coded for in the indictment.

Discussion

The data for the current study allowed the authors to account for the numerous ties that exist in the entire network and the strength of ties by measuring the frequency that each tie was mentioned in the indictment. Increasing the level of measurement for ties from dichotomized to frequency has two benefits. First, from a visualization standpoint, the strength of ties can be represented by the width of ties between two actors, or in this case, the number of times two individuals engaged in an illegal act. Second, from a statistical perspective, taking the weighted ties into consideration when computing the centrality measures increases the level of measurement from dichotomized to ratio. This methodological advancement is not often feasible, depending on the depth of the data. Given the nature of RICO indictment data in that it typically describes crimes committed by two or more people, we suggest that the weighted ties should be considered in a social network approach when possible and appropriate.

Regarding research question one on the relationship between shot-callers and crime types, we found that

shot-callers are only significantly associated with murders and attempted murders. This finding suggests that shot-callers do not necessarily commit all crime types but rather authorize the more serious types of crime. Although shot-callers are not significantly related to centrality measures, they did have more ties than most members, except for CHS-1. Compared to leadership roles found in drug cartel research, where leaders are peripheral actors in the network with very few ties (Jones et al., 2020) to ensure their security, shot-callers appear to play a more active role in the network and are highly visible, thus making them more susceptible to detection by law enforcement. Although shot-callers in this MS-13 network are highly visible, there is no statistically significant relationship between shot-callers as actors and their centrality measures. Morselli and colleagues' (2007) work on the efficiency and security trade-off in criminal networks notes that the shorter the time-to-task is for a criminal network, the more security is compromised. Networks with longer time-to-task are more efficient as they are more concerned with security than efficiency. In expanding this perspective by comparing localized street gangs (cliques of MS-13 in L.A.) to transnational drug trafficking organizations (DTOs), we argue that not only is time-to-task shorter for street gangs compared to DTOs, but also the positioning and high number of ties for shot-callers also highlight the gang's concern for efficiency over security. Therefore, the efficiency versus security trade-off perspective can be

expanded to also consider the degree (number of ties) and strength of ties for actors in leadership roles.

Findings from research question two first indicated that individuals who participated in narcotic trafficking had higher numbers in all three centrality measures, while those who engaged in extortion had a lower degree. Essentially, those actors who engaged in narcotic trafficking are significantly central to the network, and narcotic trafficking was the primary illegal act noted in the indictment. This is not surprising as street gangs often rely on profits from drug sales to fund their activities. This may also be an artifact of the indictment, as drug activity is more easily detectable than some of the other crime types. Furthermore, law enforcement relied heavily on CHS-1, who was often involved in drug trafficking, as evidenced in the indictment. Additionally, individuals involved in extortion had the fewest ties in the network. Similar to enforcers with specialized roles in other criminal networks, extorters appear to also specialize in this one crime type and seldom have other ties with non-extortion actors in the network. The second finding may also be an artifact of evidence collection as CHS-1 did not specialize in extortion and therefore did not collect much information on extorters.

Given the significant role of CHS-1 in evidence gathering, it is necessary to discuss research question three and how CHS-1's reporting likely influenced the results of the study. CHS-1 collected a tremendous portion of the evidence, contributing to 38 percent of the ties for the whole network. S/he was highly involved in a variety of crimes and provided evidence for the majority of the indictment. This finding is consistent with the previous literature on the use of confidential informants, law enforcement strategies, and biases found in law enforcement evidence presentation (Jones et al., 2020; Morselli et al., 2007; Natarajan, 2000, 2006; Von Lampe, 2009). It is not uncommon for law enforcement agencies to use CIs to infiltrate criminal groups and gather evidence that they would otherwise not have access to; however, many of these CIs are criminals themselves and are working to relieve themselves of previous charges they are facing. It is not out of the question to assume CIs may also target particular individuals in a network either because of previous relationships or even as a way of getting revenge on another member for previous transgressions, thus further biasing the network.

It is important to note that as risky as it may be for CIs to engage in evidence collection on behalf of law enforcement entities, law enforcement agencies typically go above and beyond in their efforts to ensure their safety and security. Furthermore, this finding may be an artifact of the methods used by law enforcement to gather evidence on criminal network actors (heavy reliance on informants for intel), and/or their placement in the network is the result of their level of infiltration and the importance of the actors to which they

had ties. Importantly, and as seen here, this indictment may not have ever come to fruition and been as inclusive as it was without CHS-1.

Limitations

As is the case with many studies, there are always limitations. The limitations noted here revolve around missing data and biased reporting in the indictment. First, the indictment included names for a large majority of the actors, but there were instances where individuals that were involved were not named, but instead referred to as “unindicted co-conspirators.” The context in which these individuals are mentioned often insinuates that these individuals are from other local gangs, not MS-13. This phenomenon may occur for numerous reasons related to future prosecutions, the protection of informants after the fact, or perhaps another case is being worked up on those individuals or their gang and identifying them in a court document would be detrimental to that end goal. Regardless, having these names would allow for a better understanding of ties beyond just MS-13 members.

This leads to the other limitation of the current study, namely biased reporting in the indictment, or “cherry-picking” the more important or charge-worthy incidences from the totality of evidence collected during the nine-and-a-half-year-long investigation. This approach is sound from a prosecutorial standpoint, as including every incident (menial or severe) over a nine-and-a-half-year period in an indictment would make for a lengthy and possibly overwhelming document and may further complicate the prosecution. In other words, the evidence collected by CIs is enough to prosecute the entire criminal group, but it is insufficient to detect the network's *complete* internal structure. From a research standpoint, this is a limitation because not all actors, ties, and actions are accounted for in the indictment. Furthermore, and in terms of the use of CHS-1 in evidence collection, there is room for bias as well by relying too much on one CI. This approach may lead to a biased representation of the criminal group and may speak more to law enforcement strategies and the use of CIs than the true nature of the network and its actors (Jones et al., 2020; Morselli et al., 2007; Natarajan, 2000, 2006; Von Lampe, 2009). Unfortunately, this issue is unavoidable without wiretap data. However, previous research has noted that although this type of data is a purposive sample of the evidence presented, it still includes the most key players and thus suffices for a usable dataset (Berlusconi, 2014; Bichler, 2019; Jones et al., 2020). Also, the evidence collected by CHS-1 may be biased, as they are more likely to report incidents with those who they are closer to or have pre-existing relationships with. It may also be the case that CHS-1 reported on those within the network they do not have a strong pre-existing relationship within an effort to protect associates from the investigation.

Future Research

Future studies should further examine the amount of information provided by CIs that is used to build an indictment and how this affects the network and actor centrality metrics. This can be done by coding another edge list that removes ties among actors when CHS-1 or all confidential informants are involved. This approach has at least two benefits. First, it will provide an overview of how influential confidential informants, especially CHS-1, are in developing an understanding of the network and what evidence and individuals make their way into the indictment. Second, Quadratic Assignment Procedure (QAP) analysis can be conducted to determine the statistical differences between the network with CHS-1 and the network where CHS-1 and co-conspirators are removed.

Future research should also compare the current MS-13 network with other MS-13 cliques' networks to determine whether the findings from the current study can represent the entire MS-13 gang. It is possible that the MS-13 cliques that were identified by the current indictment organized and functioned differently from other cliques, especially those that have not been detected and indicted. However, it would be much harder to study the network of an active MS-13 clique, which requires potential personal connections with active members and more safety concerns for the researchers.

The results of this study regarding actor roles can be further examined in other criminal networks to look for crime specialization. For instance, in this study, we found that shot-callers are significantly involved in murder and attempted murder compared to other crimes, and those who were involved in extortion were not significantly involved in other crime types. Specializing in a particular crime type can create compartmentation and cut-out points within a network, thus increasing efficiency by reducing the time-to-task for those few engaging in the specialized crime, which can increase the security of all actors within the network. Thus, there is a fertile expanse for future practical, theoretical, and statistical research examining dark networks.

Appendix A

Descriptive on attributes ($N=41$).

Variables	<i>n</i> (%)
Robbery	2 (5)
Conspiracy to traffic narcotics	1 (2)
Drug possession but no sale	7 (17)
Burglary	0 (0)
Gambling	0 (0)
Use of a weapon	8 (20)
Harboring/aiding/abetting	1 (2)
Graffiti/tagging	4 (10)
Prison smuggling	3 (7)
Injunction violation	2 (5)
Green-light decision-making	0 (0)
Incarcerated	1 (2)

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Declarations

Conflict of interest There is no conflict of interest.

Informed Consent The study examined a public available court indictment, so a consent form is not needed.

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