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The Promise of a Network Approach for Policing Research

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Abstract. Considerable attention has been devoted to understanding police socialization and the resulting culture, yet only recently have scholars turned to a network approach to understand the police organization itself. We extend these efforts with results from a pilot study of officer networks in a large US police department. Network data are collected from 88 front-line officers to examine officers' informal working relationships. Our findings shed light on the connected nature of officer relationships, showing how personal support networks intersect and diverge from more formal advice and mentorship networks. The study provides an alternative starting point for understanding socialization as a vehicle of officer attitudes, values, and behaviors. Likewise, it demonstrates the applicability of a network approach for understanding departments' social and structural organization. We conclude with a discussion on how officer networks can inform meaningful policy initiatives, including shifting organizational climate, enhancing retention, and curbing abuses.

Keywords: police networks, informal relationships, socialization

Introduction

Police departments have increasingly faced calls for reform in response to public concerns about officer-involved shootings, racial bias, and excessive uses of force (e.g., Edwards, Lee, & Esposito, 2019; Legewie, 2016). These agencies have also been dealing with a host of internal struggles, from difficulties retaining police officers to high occupational stress, depression, and suicides (e.g., Bishopp et al., 2018; Roberts, 2019). Such issues have immeasurable impacts on the officers dealing with them, their departments, and the communities they serve. Perhaps most importantly, these problems impede departmental efforts to address crime in an impartial, efficient, and consistent manner.

Current discussions about police reform can be broadly classified into individual and departmental-level approaches. Officer traits such as sex, race/ethnicity, education, and psychological dispositions are often invoked to explain variation in pro- or anti-social behaviors (i.e., 'rotten apples') (Brandl, Stroshine & Frank, 2001; Burke, Waters & Ussery, 2007; Kane & White, 2009; Ridgeway, 2016; 2020). Departmental-level structures draw on police departments' formal and informal features, such as organizational size, police cultures, and hypermasculinity as the main drivers of police behaviors (i.e., 'rotten barrels') (Huff, White & Decker, 2018; Paoline, 2003). These approaches have prompted calls for a host of reforms, from hiring more college-educated and minority officers to increasing officer accountability and improving police-community relations.

We argue that a key gap in prior research is a lack of attention to the middle-level of explanation - the *social relationships* between officers. Policing is known for its tight-knit organizational culture wherein officers learn different forms of conduct through interactions with fellow officers (Niederhoffer, 1967; Savitz, 1970). Formal interactions with training and

supervising officers, as well as informal relationships with peers, play a critical role in structuring attitudes, behaviors, and inculcation into the police culture (Chappell & Lanza-Kaduze, 2010; Chappell & Piquero, 2004; Engel, 2003; Getty, Worrall, & Morris, 2016; Roithmayr, 2016). These relationships can be represented as networks, allowing us to measure these interactions' formal properties and structural features.

Although the literature on police networks has grown in recent years, very little is known about the social organization of policing beyond departments' hierarchical lines. In this paper, we propose to extend policing research to include the study of informal networks and working relationships that shape officers' attitudes and behaviors. In line with our argument, we report results from a pilot study of officer networks enabled by a close partnership with a large urban police department. Using a network-based survey design, we asked 88 front-line officers about their informal relationships (e.g., friendship, advice, mentorship) within the department. Our pilot results demonstrate the feasibility of a network study of the social organization of departments. We highlight in this paper how a network perspective can inform novel and actionable policy initiatives.

A network framework for policing research

Social network analysis has been used extensively to study social processes, including the diffusion of innovations, peer influences, and social learning (Coleman, Katz, & Mendel, 1965; Moody, 2001; Valente, 1995). Rather than focus on individuals, the object of study under a network framework is the complex web of relationships between individuals, groups, or other entities that make up social systems. Network analytic techniques enable researchers to mathematically quantify and define sociological properties that otherwise remain abstract and intractable. The local density of relationships (i.e., clustering) may suggest the emergence of

informal groups in social organization. The identification of actors who play a singular role in the overall system's connectivity (i.e., centrality) may reflect informal leadership qualities in these individuals and highlight their role and potential for the facilitation or obstruction of information flowing in these networks. These properties of social systems are at the core of dynamic processes that shape attitudes, norms, and social actions.[1] In criminology, depicting social systems as networks has transformed our understanding of delinquent peer influence (Haynie, 2001), the spread of gun violence (Papachristos, 2009), and the structure of organized crime (Morselli, 2009).

This paper details how a network framework can contribute to the study of policing. Departments' paramilitary structures may give the impression that officers are siloed into clear-cut functional units. Yet, officers are free to socialize beyond their workgroups. Officers move from one unit to another through transfers, new assignments, and promotions. The relationships formed by these circumstances and daily interactions form an intricate web of informal relationships that are not entirely constrained by geographic assignments, functional units, and formal hierarchies. The promise of a network approach lies in the fundamental idea that the connections officers form with others over their careers matter; in defining an officer's worldview, attitudes, and behavioral responses to her environment, but also in facilitating and hindering the adoption of alternative views and behaviors throughout an entire department. A network framework allows us to understand how these social systems shape attitudes and behaviors and, importantly, propose ways to leverage these networks to identify new actionable tools for police reform.

For as long as scholars have studied policing, they have highlighted the formative role peer relationships, camaraderie, and mentorship play in throughout a police officer's career. Classic

[1] For more extensive treatment of social network analysis and its conceptual and technical applications see Wasserman and Faust (1994), Scott (2017), and Scott and Carrington (2011).

works have chronicled the particular importance of informal social interactions in adopting, shaping, and rejecting practices, behaviors, and attitudes (e.g., Bittner, 1970; Niederhoffer, 1967; Reuss-Ianni, 1983; Savitz, 1970). As the field caught up with advances in social learning theories, scholars have observed that officers tend to engage in behaviors similar to their assigned colleagues'. An officer's field training officer and their workgroup have direct consequences for officers' actions, including the likelihood of engaging in misconduct and other abuses (Engel, 2003; Getty et al., 2016; Ingram, Terrill, & Paoline, 2018; McCluskey, Terrill, & Paoline, 2005; Terrill, Paoline, & Manning, 2003). Given the importance of informal groups and other relationships in shaping officer behaviors, the field of policing has been primed for the application of social network analysis.

While discussions of peer influence, socialization, and tight-knit organizational structures are deeply rooted in the policing literature, only recently have police scholars begun to employ network methods. Some of the earliest investigations of police networks showed that officers who socialized more frequently espoused more similar attitudes (Pastor & Mayo, 1995). Even basic changes to formal officer interactions influenced the development of friendship ties and officer attitudes (Conti & Doreian, 2010). Conti and Doreian (2010) found that joint squad membership and adjacent seating assignments enhanced friendship formation among recruits, irrespective of race, and this association only increased over time. These findings emphasized the importance of bonds formed in the police academy, which tend to have staying power across a policing career (Haarr, 2001; Van Maanen, 1973).

More recently, police scholarship has provided insight into the networked nature of police misconduct. Wood, Roithmayr, and Papachristos (2019) used official complaint records to extract deviant relational data defined as officers' co-involvement in misconduct. Their study shone a

spotlight on the networked structure of officer misconduct similar to that found in studies of criminal co-offending. Their results reveal that while misconduct is concentrated among a relatively small group of officers, these officers are connected to a large number of other officers. Their findings also shed insight into the factors that lead certain officers to engage in misconduct with some officers, but not others. Specifically, officers from different racial backgrounds and less experienced officers who were paired with more senior officers were less likely to become involved in misconduct with one another, providing insight into how changes in partnership structures may amplify or attenuate the likelihood of misconduct.

Work by Ouellet and colleagues (2019) and Quispe-Torreblanca and Stewart (2019) provided evidence that officers' positions within misconduct networks can also explain problematic behaviors. By examining an officer's exposure to deviant colleagues, these studies found that officers learn to engage in misconduct through exposure to problematic officers within their networks. Officers who were embedded in networks with colleagues who had histories of applying force were more likely to use force in citizen encounters. Further, being exposed to females within one's misconduct network reduced the risk of engaging in more serious misconduct (Ouellet et al., 2019). These studies reinforce the importance of considering officers' histories when pairing officers in efforts to curtail the social transmission of misconduct.

Zhao and Papachristos (2020) extended this network framework to explain firearm use within departments. They found that officers positioned as brokers within the misconduct networks – connecting otherwise unconnected officers – were more likely to shoot. Their findings suggest that officers who serve as intermediaries within the misconduct network are exposed to different opportunity structures and norms, which increases their risk of firing their weapons. Although not an explicit network approach, similar findings were observed by Grunwald and Rappaport (2020),

showing that officers who shuffle from one department to the next – and thus serve as 'brokers' between departments – were at a higher likelihood of being involved in misconduct. Together, these studies provide a convincing demonstration that efforts to understand and shift behaviors and attitudes require considering individual- or departmental-level characteristics and how officers are positioned within departmental networks.

Moving research on policing networks forward

Recent studies of police networks have examined officers' formal networks – how officers are connected through their shared work assignments (e.g., Ingram et al., 2018; Quispe-Torreblanco & Stewart, 2019) – and officers' misconduct networks – how officers are connected within misconduct complaints (e.g., Ouellet et al., 2019; Wood et al., 2019; Zhao & Papachristos, 2020). Yet, there is reason to believe that officers' relationships can and should be extended to understand the full set of formal and informal relationships that shape pro-social and anti-social behaviors. Measuring these informal relationships can lead to meaningful insights into police scholarship. We highlight three ways below.

Social organization and structure

Representing the informal relationships that span the department as a network can be used to better understand how the various units and levels of management interact or are split into factions to make-up the social organization of departments. Network representations of a police department can highlight the natural emergence of informal groups that may impede information flow and cooperation and ultimately produce challenges in carrying out effective police work (Bittner, 1970; Reuss-Ianni, 1983). Similarly, visualizing networks of relationships across a department can provide insights on novel ways to facilitate communication. Identifying

individuals or subgroups who act as bottlenecks for the flow of information may constitute critical targets in efforts to promote a more cohesive and effective agency.

Social influence and behavior diffusion

Individuals' positions within the broader network can help identify 'popularity' or influence, providing useful tools for departments wanting to identify individuals who may be vital to curbing or spreading ideas and behaviors. Individuals who are central to the network, relative to their colleagues, may hold more sway in their ability to influence others or diffuse information (Valente, 1995). In contrast, those who are more isolated from other officers may be less likely to be embedded in departmental norms. Much like focused deterrence approaches where offender networks are leveraged for crime reduction strategies (Braga & Weisburd, 2015; Papachristos, Meares, & Fagan, 2007), officer networks can be leveraged to identify "intervention agents" or "intervention groups" that are likely to promote behavior adoption or change (Valente, 2012).

A network framework can thus begin to answer some of the most pressing questions in police research: how do officers come to adopt and then socially transmit behaviors and attitudes? Much of the policing scholarship contends that officers operate within a police subculture. A police subculture is a function of departments' peculiarities as organizations (e.g., paramilitary organizational style) and the inherent risks and dangers associated with the work (Paoline, 2003; Sierra-Arévalo, 2019; Skolnick & Fyfe, 1993). Yet, we know little about the social processes that promote the subculture's adoption and transmission from one officer to the next (Paoline, 2003; Ingram et al., 2018; Terrill et al., 2003). Do officers self-select into the police culture based on individual proclivities, or are norms impinged upon them by those with whom they have frequent, meaningful contacts? Are they recruited into networks by influential colleagues or superiors? By mapping out informal relationships, network analysis can disentangle how social forces shape

officer behaviors and attitudes (Gallupe, McLevey, & Brown, 2019; Steglich, Snijders, & Pearson, 2010).

Group processes and cohesion

A network framework also provides novel ways to directly measure the 'grouped' nature of police work, providing a set of relational techniques to delineate social groupings of tightly knit officers. Given the fundamental importance of groups to police work, identifying and understanding officers' informal groupings can provide insight into how cliques form, evolve, and progress to foster more pro-social or abusive behaviors. For instance, if deviance is clustered within 'misconduct networks,' it is also possible that pro-social behaviors are clustered within the larger set of police interactions (Wood et al., 2019). Understanding how deviant and pro-social networks intersect can provide insight into how groups form and move into deviant or non-deviant behaviors. It follows that if cohesion reinforces already held views (e.g., Friedkin, 1993), departments may want to encourage cohesion within pro-social groups but discourage cohesion when misconduct is a staple of the group's repertoire.

In police departments, command staff are in unique positions to shift officers' informal relationships (see, Conti & Doreian, 2010; Wood et al., 2019). From reassignment to removing officers until problematic behaviors are addressed, departments can shift the internal structure of informal relationships, providing an opportunity to play a role in how ideas and behaviors are adopted and transmitted. A focus on networks can thus provide new insights and tools for assessing organizational climate, addressing problematic behaviors, and implementing reform. However, in order to deploy these solutions requires understanding a department's internal structure. This is what we turn to below.

Current study

The aim of our study is to test the feasibility and utility of a network survey design for collecting data on informal officer relationships. With this aim in mind, we implemented and administered a pilot network survey to a sample of 88 street-level proactive investigators. The survey aims to extend prior research by measuring the informal social relationships between officers. Prior research has primarily focused on formal relationships - officers who share the same workgroup - or officers who are co-named in the same complaint. The current study extends these investigations to all officers to measure a variety of informal officer relationships (e.g., friendship, advice, and mentorship) and explores the applicability of a network approach. Network studies are particularly unique as they require respondents to be aware of their own (and potentially others) relationships and to report on these. As such, the survey design allows us to gauge response rates, generate feedback, and obtain preliminary insights into officers' networks.

Research site and partnership

The research took place in one of the 50 largest police departments in the United States. The department has a nationally accredited training program, utilizes a COMPSTAT style management framework, and has specialized units to address homicide, gang, and auto crimes. These characteristics are important as they structure how officers interact and the types of crimes they routinely face.

The research site was also selected due to an established partnership between the researchers and the agency. One reason that network studies have been so rare is not due to the applicability of the approach but rather challenges in gaining access and building the necessary partnerships to collect large-scale network data. Police departments often lack the necessary resources to implement and carry out network studies on their own. Network designs take

substantial time and effort, which is a challenge for departments who are already strained for staffing and resources.

The established research partnership allowed for the pilot survey development and a follow-up commitment from the command staff to facilitate survey administration to all sworn officers on the force. This level of access and trust is not the norm, but it is possible (also see IACP, 2004; Rojek, Smith, & Alpert, 2012; Rojek et al., 2014). Researchers' attempts to access departments may be viewed with suspicion, carrying risks for departments by opening them up to outside scrutiny and potential liabilities (Goff & Khan, 2012). Partnerships thus require relationships steeped in trust. The current project represents a wholesale leveraging of the trust and familiarity that has been built over the years. For over a decade, members of the authorship team have worked closely with the host department on various research and training initiatives. Recent examples include audits of officers' body-worn camera usage, evaluation of a gunshot detection system deployment, and annual leadership training to mid-level supervisors. In these respects, our project is the result of an established track record of providing practical knowledge and pro-bono work that translated into the necessary access to implement the current project and develop mutually beneficial outcomes (also see Alpert, Rojek & Hansen, 2013).

The goal of the partnership between the agency and the researchers was to pool resources and knowledge to address pressing issues within the department while also providing the research team an opportunity to investigate other substantive areas of interest. Specifically, we proposed the network design to develop and share actionable insight into the organization's internal structure, with a focus on developing network tools to curb turnover and enhance retention of high performing officers. The results aim to provide the agency with insight into how officers are connected, including fragmentation or integration within and across units. Importantly, as part of

the partnership, we agreed to provide a de-identified oral and written briefing on our findings to the department.

The partnership was strengthened by reciprocity. With agency input enriching the study's research design and ensuring the network findings would lead to actionable and meaningful outcomes (see Engel & Whelan, 2010). The pilot study benefited greatly from the insights of line and command staff level officers, who volunteered their time and feedback to refine and improve our network questions. Discussions with officers provided insight into the face value validity of the network questions and potential receptiveness of answering these questions. One thing we repeatedly heard across all ranks was the need for the network survey to be short. Officers face a host of demands on their time, and surveys are typically not considered a priority. We respected this by ensuring the survey was as quick and easy to complete as possible, using touch screen tablets, and employing a whole network survey design (detailed below). We also received invaluable clarification on the proper jargon and suggestions on how to frame and order sensitive questions relating to officer relationships and misconduct histories. Such constructive feedback would not have been possible without open and longstanding channels of communication between the research team and officers within the department.

Sample

The pilot study's main goal was to test the network survey in a truncated data collection effort. With this goal in mind, we targeted a sample of street-level proactive investigators across eight units within the department. Selecting this particular group of officers for a pilot data collection served three purposes. First, from an efficiency standpoint, this subgroup constituted a small enough group we could survey in its entirety without spending more time and resources than is necessary to accomplish the goal of piloting our data collection strategy. Second, this subgroup is

considered relatively distinct and well-defined within the department, providing us with the ability to perform analogous analyses with this subgroup that we hope to accomplish at the departmental-level (i.e., global network analyses). Third, preliminary discussions with officers and agency leadership suggested that this particular subgroup of officers may be the least receptive to our data collection efforts. It was assumed that the nature of their assignment might place them at a higher risk of engaging in problematic behaviors, which may have translated into a greater unwillingness to discuss interactions with colleagues. In other words, we were told if street-level proactive investigators were willing to answer our survey, most officers in the department would.

We invited 94 street-level proactive investigators to participate in the survey during designated roll-call sessions across eight different proactive units, including the fugitive unit, narcotics, and SWAT. On each occasion, the research team introduced the study and detailed the informed consent form.[2] Data were collected using a survey instrument administered on iPads. Of the 94 officers who were present, 88 consented to complete the survey for a response rate of 94 percent. Of the 88 surveys, 82 were retained, with six being dropped due to lacking a valid unique identifier, which precluded us from linking officers and their networks.

INSERT TABLE 1 ABOUT HERE

As shown in Table 1, the majority of the officers in our sample were male (91%). Most of the officers identified as Black (52%), or White (39%), with the remaining officers classified as other (9%). Officers also varied in age and years of experience on the job. Officer ages ranged from 24 to 56 (M = 39.55; SD = 8.25), and officer tenure on the job ranged from 2 to 33 years (M

[2] To provide safeguards and alleviate concerns about potential coercion, we developed specific protocols for administering the survey. First, when introducing the research project, we emphasized that the survey was voluntary. Second, we collected the surveys and consent forms after the designated survey administration period so that it was not apparent which officers elected to participate and which officers did not. In addition, should officers' further desire to conceal their non-participation, we equipped all survey tablets with a game application so that officers were free to click on it rather than the survey. All protocols were approved by the university's Institutional Review Board.

= 12.92; *SD* = 7.91), consisting of both recent hires and more seasoned officers. The mix of experience is also reflected in officer ranks, with 52 percent of the sample comprising police officers, 29 percent investigators, and 18 percent as sergeants, lieutenants, or captains.

Network data collection procedures

One of the first decisions in collecting network survey data is deciding whether to focus on the 'whole network' or the 'egocentric network.' Whole network, or sociocentric approaches, require collecting network data from as close to all elements in a population as possible. In a whole network approach, each respondent is asked to list their nominations, and then once all surveys are completed, nominations are linked across the surveys to map out the whole network. In contrast, an egocentric network approach requires each respondent to nominate others within their network, as well as their perceptions of how these nominations are connected to one another. Whole network designs offer many advantages when you have a bounded population, as is the case here. Specifically, whole network designs allow for analyses at the network-level (i.e., sociocentric) or at the individual-level (i.e., egocentric) as ego-networks are subsumed within and can be extracted from the whole network. In addition, whole network designs reduce the complexity and time to complete each survey. Our partnership limited the surveys to 10 to 15 minutes of duration. A whole network strategy allows us to meet this requirement.

In the pilot study, we were only able to survey a fraction of all street-level proactive investigators, capturing only 22 percent of the department's approximately 400 proactive investigators. Ideally, we would have sampled all 400 proactive investigators; however, we were limited to surveying officers during designated roll-call sessions for the pilot. This had important implications for collecting survey data, as it meant that we would need to return to the same unit multiple times in order to survey all officers. Because officers are on different rotations, and many

elect in and out of different days due to leave, sicknesses, and holidays, it meant that even at different roll call sessions, we would encounter many of the officers who had already taken the survey. This meant officers who had taken the survey would be sitting through the session more than once and may lead to instances where it could be identified who had participated and who had not. These factors, along with not wanting to stress our relationships with lieutenants, meant we only returned to each unit once. Although it truncated the sample and limits the findings drawn from the study, it did allow us to achieve the pilot's main goal: to test our data collection instrument prior to administering it to the full set of officers.

We elicited data on officers' informal networks by asking officers to nominate i) five colleagues they consider friends, ii) five colleagues they turn to for professional advice, and iii) one colleague they consider an informal mentor.[3] Practical considerations led us to limit the number of nominations. It greatly simplified the time and cognitive burden to complete the survey, allowing us to ask additional questions about the nature of the relationship (e.g., the year they met, and the frequency they hung out). Mentorship nominations were limited to a single mentor, which allowed us to isolate the most important mentor within an officer's network and assess whether they are embedded within their broader professional advice network.

Pilot study results

The results provide insight into officers' willingness to answer network questions and whether informal relationship types differ in meaningful ways. Our pilot study successfully demonstrates the feasibility of the research design, with 90 percent of surveyed participants completing the

[3] Specifically, we asked officers to nominate i) "up to five colleagues that you have their personal phone numbers and are likely to call or text regarding personal matters," ii) "up to five colleagues that you turn to for professional advice," and iii) "one colleague that you would consider an informal mentor (i.e., a more experienced member of the department who counsels you on broad issues, such as career planning, navigating departmental politics, and becoming a better police officer."

network questions. Of the 74 officers who responded to the network questions, they nominated a total of 317 officers. On average, each officer nominated 3.82 friends (*SD* = 1.85) and 3.91 colleagues they went to for advice (*SD* = 1.49). Approximately two-thirds of officers reached the cap for the network questions, with 66 percent of officers nominating five friends and 57 percent nominating five advice partners.

Because officers could nominate the same colleague in both their friendship and advice network, it offers an opportunity to look at the multiplexity of relationships. Multiplexity refers to instances where relationships serve more than one role at once. Figure 1 showed that it was rare for more than one relationship type to exist between officer pairs. Only one quarter (27%) of all officer nominations involved multiplex relationships. This result shows who officers considered friends were distinct from whom they sought out for advice or mentorship. Indeed, in only five percent of cases did an officer consider a fellow officer to be a friend, an advice partner, and a mentor. Officers rarely considered their friends to be sources of advice, with only 24 percent of friendship and advice nominations overlapping. In contrast, officers frequently considered their mentor to be friends or advice partners, with 73 percent of mentor nominations overlapping.

INSERT FIGURE 1 ABOUT HERE

Multiplexity is an important feature of policing. Strong bonds can further embed an officer into the department or institutional culture and increase the social benefits of conformity and social costs of non-conformity. Officers who are connected through multiplex relations may face a different set of resources and pressures than officers who are not embedded within multiple relationship types. When relationships overlap (i.e., an officer who considers a colleague both a friend and a mentor), stronger dependencies, including expectations and responsibilities, emerge (Feld, 1981; Verbrugge, 1979). The intersection between different types of relationships can

influence the type and the likelihood that information and other resources may flow, with overlapping social bonds providing wider social channels.

The structure of police networks

Figure 2 shows how the officers in our sample are connected through their informal relationships, breaking this down by friendship, advice, and mentorship. We first examine the 'whole network' to identify the informal social structure of the sampled officers. We then extract the 'ego-networks' of each officer to identify variation in officers' structural positions across the networks. This allows us to shed preliminary insight into the social organization of the department.

In Figure 2, each node represents a unique officer, with grey nodes identifying officers who responded to the survey, and white nodes officers who were nominated but did not take the survey, and thus did not have an opportunity to nominate others within the network. Relationships are directed, meaning that they distinguish whether an officer 'sent' a nomination (e.g., the colleagues they nominated as friends) or whether an officer 'received' a nomination (e.g., the colleagues who selected them as a friend). The full network shows the 'weight' of these ties, with thicker edges between the nodes representing officers nominated for more than one tie type (e.g., officers who are considered friends as well as mentors).

INSERT FIGURE 2 ABOUT HERE

One of the most striking features of the police network is its high interconnectivity. Even though a fraction of street-level proactive investigators were sampled, we find that the network is highly connected with most officers directly or indirectly connected. In the friendship network, 90 percent of the officers belong to the largest connected component, and in the advice network, 94 percent belong to the largest connected component. On one hand, this may not be surprising given that we sampled officers within eight workgroups; we should expect to see connectivity between

officers within their assignments. However, our finding departs from prior research that has measured officers' formal relationships. Had we mapped officers' formal relationships – defined as officers being connected by virtue of sharing the same workgroup – the network would have shown eight independent cliques (one for each of the eight workgroups). In contrast, by mapping the informal network, we find that several pathways exist between these workgroups. In fact, it is difficult to identify any clear groupings that result from the original formal groups when looking at the informal networks shown in Figure 2.

The informal structure of relationships that link and span workgroups are essential for understanding how ideas, attitudes, and practices may flow within a department. Early policing theories emphasized the importance of understanding the internal structure of agencies for assessing departments' effectiveness. For instance, Bittner (1970) and others argued that "what appears at first glance as a uniform esprit de corps functions mainly as an infinite variety of contingently collusive arrangement that...solidify a plethora of internal schisms and conspiracies" (p. 64, also see Reuss-Ianni, 1983). Mapping police networks provides a tool to detect structural divisions, impeding the sharing of information and resources for achieving collective outcomes. For command staff, these networks provide a means to understand the organization's structure and can be used as a starting point for departments wishing to detect and mend social fractures.

Figure 2 also shows how different relationship types alter the network topology. Let's only consider the networks of officers who responded to the survey (grey nodes). We find that officers are more clustered and easier to reach directly or indirectly within the advice network. Officers are within 2.37 connections, or 'hands-shakes' of any other officer within the advice network, in contrast to 3.44 hand-shakes in the friendship network. In part, these findings result from the different thresholds involved in deciding who is nominated for each relationship. Friendship

relationships imply stronger bonds between officers, whereas advice networks may simply require workplace collegiality. On the one hand, this finding offers an indicator of the face validity of the network questions. On the other, it highlights the need to consider different types of relationships in a network design. From a policy perspective, friends may have more influence on officers' beliefs and norms, but this higher threshold creates distance across the full set of officers. Rather,it is much easier to reach other officers through advice networks. This finding can inform how departments deploy new types of information within the department.

Network positions of key officers

Table 2 shifts the analytic focus to individual officers' structural positions within the overall network (i.e., ego networks). We identify officers who are central to the network, either because they were frequently nominated by their colleagues (i.e., high in-degree centrality) or are positioned as brokers (i.e., high in betweenness centrality). Our results show that very few officers occupied central positions across the friendship, advice, and mentorship networks. *Officer A* is one of these few officers who was nominated more often than others as someone who was considered a friend, a source of advice, and as a mentor. These findings show that some officers are better positioned to spread messages and potentially diffuse behaviors and attitudes within a department.

Conversely, an officer's network position may also identify the officers who are on the periphery of the department (i.e., have few ties to others), and thus relatively isolated from others. Social isolation may result in officers being less embedded within departmental norms and behaviors and at a higher risk of leaving (e.g., Krackhardt & Porter, 1986). For instance, Muir (1977) observed the consequences of not being embedded within a policing social cohort, which cost a police recruit the necessary social resources to "hammer out the meaning of his experiences" and "sharpen the eye for detail" (p. 31). Indeed, when repeated across many social interactions,

officers who are isolated may not be as influenced by a police culture that emerges within dense social interactions. Network metrics allow us to empirically assess how low (or high) one's social integration is within the police network and link this with other behaviors (e.g., retention, mental health, misconduct).

Table 2 also shows that officers tend to emerge as brokers – bridging otherwise unconnected officers – in either the friendship or the advice network, but rarely in both. Indeed, while some officers bring together different friendship groups, others connect individuals across advice relationships. Brokers have distinct advantages within a network. They are optimally positioned to transfer (or withhold) information and resources across disconnected groups, making them a valued resource for those who cannot directly reach others (Burt, 1992; 2004; 2005). The consequences of occupying brokerage positions within networks have been linked to a host of beneficial outcomes, including promotions and compensation (Burt, 2004; 2005). However, in one of the few studies to examine brokers within policing, brokerage has also been linked to more adverse outcomes, including a higher likelihood that an officer will fire their weapon (Zhao & Papachristos, 2020). Identifying brokers within departments can provide insight into why and how ideas and behaviors are spread and those who are most at risk of engaging in them.

Officers who are central to the department network may serve as prime intervention agents for diffusing messages or behaviors, bridging various segments of the police social system, and reaching a high number of officers. In moving forward, these metrics can and should be merged with existing data on officers' behaviors and activities (e.g., histories of abuse). Moreover, they should be incorporated into statistical analyses to estimate diffusion models and measure formation, change, and termination in relationships.

Discussion

In this paper, we demonstrate the promise of a network framework for policing research and provide examples of the unique insights that can be generated from network data. Considering different relationships highlights the multiple pathways for information and behavioral diffusions within departments. More so, it highlights the importance, and the interdependent nature, of relationships. Like members of other formal organizations, officers are nested within partnerships, which are nested within workgroups, which are nested within the department. Indeed, while hierarchical order is established formally through one's role and rank, order can also emerge informally, through the sets of relationships that form over an officer's career. How officers select into these relationships and are thus formally and informally socialized into police work is important for understanding the organizational and occupational culture (Niederhoffer, 1967; Savitz, 1970).

A network framework provides a crucial step forward for uncovering patterns and social processes as they relate to social practices and the emergence of departmental culture. However, it bears repeating that the network data collection instrument is designed for a whole network study, where close to all population elements are sampled. Our pilot only sampled a segment of the targeted population. As such, we only capture a fraction of the possible relationships. While we can look across differences in the advice and friendship networks, we cannot speak to the department's true 'connectivity' or how behaviors may spread within these networks. What we can speak to is the importance of informal relationships for spanning formal boundaries. Our pilot study shows that there are informal web of relationships that connect officers beyond bounded workgroups, creating variation in connectivity both within and across workgroups. It is within these informal relationships through which behaviors and attitudes have long been theorized to spread. The network survey allows us to study these relationships.

One important area that will inform future iterations was that our results showed officers' tendency to nominate the full limit for network questions. Many officers nominated five officers they considered friends or sources of advice. This provides preliminary evidence that we may be artificially truncating officer relationships (Marsden, 2011).

Networks for police reform

Departments by design, shape, and routinize the social interactions between officers (see Wood et al., 2019; Zhao & Papachristos, 2020). Who an officer trains with, partners with, and works with shapes their potential pool of network partners, and ultimately the types of social relationships that emerge. Whether intentionally or not, departmental policies thus play a direct role in how the agency is structured, how information flows, and whether behaviors spread. If informal relationships serve as social conduits through which good and bad behaviors can be transmitted, then reassignment policies may unintentionally promote or curb the spread of behaviors unless officers' social networks are considered. For instance, officers' network history may carry over into new assignments, creating shifts within the informal department structure and potentially exposing officers to different behaviors and attitudes. Command staff may do well to take stock of who the central players are within the department when implementing new policies, training, or disseminating information.

Similarly, early intervention systems may do well to consider the social networks of officers. Prior research suggests officers partnered with colleagues who have histories of misconduct may be at a higher likelihood of engaging in these behaviors themselves (Ouellet et al., 2019; Quispe-Torreblanco & Stewart, 2019). Identifying whether officers elect into informal relationships with more deviant officers may signal potential shifts in officer behaviors and attitudes prior to the problem behavior emerging. Thus, providing actionable tools for command

staff to restructure these networks toward more pro-social officers who can provide models of reinforcement while also isolating problematic officers until these behaviors are addressed (see Ouellet et al., 2019; Quispe-Torreblanco & Stewart, 2019). Considerations of these network features can be used to prevent the formation of deviant subgroups, interject new models of behaviors, and ultimately respond to abuses.

Surveying informal police networks can provide meaningful insight to command staff about the integration of their organization. Simply mapping informal relationships among officers allowed us to identify individuals who had more influence in the department by virtue of their network positions. Surveying officers across a department and coupling this with information on behaviors and practices may help identify those who serve as prime intervention agents to spread reform or curb the spread of bad behaviors.

Partnership Takeaways

Our pilot network survey of a large urban police department provides important takeaway messages regarding the importance of researcher-practitioner partnerships. First, there is little doubt that the robustness of our pilot data were dramatically enhanced as a result of the longstanding relationship that the researchers have with the agency in question. The existing trust yielded access to whole investigative units and a willingness among key stakeholders to review the survey instrument and its distribution protocols. We expect similar benefits as we deploy a department-wide data collection effort that will require matching the survey data to sensitive performance, employment, and disciplinary data. Second, the existing relationship afforded us key insights into the organization's structure and cultural dynamics that allowed us to ask the right questions and avoid roadblocks to our efforts. Third, we came to appreciate how important it is to have a patient and persistent approach with all levels of the command staff to foster access and

follow through on study protocols. Like many other forms of inquiry, network research are complicated endeavors and are far more effective on the front end (data collection) and backend (policy change) with the benefit of willing partnerships.

Conclusion

In this paper, we argue that a network framework can extend how we understand the police social system, with a focus on how officers' positions within these networks can constrain or promote their access to a set of resources, beliefs, and attitudes. Efforts to understand and thus ultimately shift police behaviors should consider officers' individual characteristics and how they are positioned within the larger departmental network. Our pilot study of police networks demonstrates the feasibility and utility of collecting network data for understanding the informal social system of policing. In addition to underscoring the highly connected nature of officers, our study identified key individuals who were optimally positioned within the network to target for reforms and diffuse information. The pilot study paves the way for deploying the network survey to all sworn officers within the department and linking the network data to officer behaviors and attitudes. Our findings suggest that a network approach to policing is not only a feasible goal but also shows great promise for extending police scholarship.

References

Alpert, G. P., Rojek, J., & Hansen, A. (2013). *Building bridges between police researchers and practitioners: Agents of change in a complex world.* Washington, DC: National Institute of Justice.

Bishopp, S. A., Leeper Piquero, N., Worrall, J. L., & Piquero, A. R. (2018). Negative affective responses to stress among urban police officers: A general strain theory approach. *Deviant Behavior,* Advance online publication. https://www.tandfonline.com/doi/abs/10.1080/01639625.2018.1436568.

Bittner, E. (1970). *The functions of the police in modern society: A review of background factors, current practices, and possible role models*. Chevy Chase, MD: National Institute of Mental Health, Center for Studies of Crime and Delinquency.

Braga, A. A., & Weisburd, D. L. (2015). Focused deterrence and the prevention of violent gun injuries: Practice, theoretical principles, and scientific evidence. *Annual Review of Public Health*, *36*, 55-68

Brandl, S. G., Stroshine, M. S., & Frank, J. (2001). Who are the complaint-prone officers?: An examination of the relationship between police officers' attributes, arrest activity, assignment, and citizens' complaints about excessive force. *Journal of Criminal Justice, 29*(6), 521-529.

Burke, R., Waters, J. A., & Ussery, W. (2007). Police stress: History, contributing factors, symptoms, and interventions. *Policing: An International Journal of Police Strategies & Management, 30*(2), 169-188.

Burt, R. S. (1992). *Structural holes: The social structure of competition*. Cambridge, MA: Harvard University Press.

Burt, R. S. (2004). Structural holes and good ideas. *American Journal of Sociology, 110*(2), 349-399.

Burt, R. S. (2005). *Brokerage and closure.* Oxford: Oxford University Press.

Chappell, A. T., & Lanza-Kaduce, L. (2010). Police academy socialization: Understanding the lessons learned in a paramilitary-bureaucratic organization. *Journal of Contemporary Ethnography, 39*(2), 187-214.

Chappell, A. T., & Piquero, A. R. (2004). Applying social learning theory to police misconduct. *Deviant Behavior, 25*(2), 89-108.

Coleman, J. S., Katz, E., & Menzel, H. (1966). *Medical innovations: A diffusion study.* Indianapolis, IN: The Bobbs-Merrill Company.

Conti, N., & Doreian, P. (2010). Social network engineering and race in a police academy: A longitudinal analysis. *Social Networks, 32*(1), 30-43.

Edwards, F., Lee, H., & Esposito, M. (2019). Risk of being killed by police use of force in the United States by age, race-ethnicity, and sex. *Proceedings of the National Academy of Sciences, 116*(34), 16793-16798.

Engel, R. S. (2003). How police supervisory styles influence patrol officer behavior. In R. G. Dunham & G. P. Alpert (eds.), *Critical issues in policing: Contemporary readings, 7th Ed* (pp. 219-228). Long Grove, IL: Waveland Press Inc.

Engel, R., & Whelan, J. L. (2010). Police-academic partnerships: Ending the dialogue of the deaf, the Cincinnati experience. *Police Practice and Research: An International Journal, 11*(2), 105-116.

Feld, S. L. (1981). The focused organization of social ties. *American Journal of Sociology, 86*(5), 1015-1035.
Friedkin, N. E. (1993). Structural bases of interpersonal influence in groups: A longitudinal case study. *American Sociological Review, 58*(6), 861-872.
Gallupe, O., McLevey, J., & Brown, S. (2019). Selection and influence: A meta-analysis of the association between peer and personal offending. *Journal of Quantitative Criminology, 35*(2), 313-335.
Getty, R. M., Worrall, J. L., & Morris, R. G. (2016). How far from the tree does the apple fall? Field training officers, their trainees, and allegations of misconduct. *Crime & Delinquency, 62*(6), 821-839.
Goff, P. A., & Kahn, K. B. (2012). Racial bias in policing: Why we know less than we should. *Social Issues and Policy Review*, 6(1), 177-210.
Grunwald, B., & Rappaport, J. (2020). The wandering officer. *Yale Law Journal, 129*(6), 1676-1782.
Haynie, D. L. (2001). Delinquent peers revisited: Does network structure matter? *American Journal of Sociology, 106*(4), 1013-1057.
Haarr, R. (2001). The making of a community policing officer: The impact of basic training and occupational socialization on police recruits. *Police Quarterly, 4*, 402-33.
Huff, J., White, M. D., & Decker, S. H. (2018). Organizational correlates of police deviance. *Policing: An International Journal. 41*(4), 465-481.
International Association of Chiefs of Police (IACP). (2004). *Unresolved problems and powerful potentials: Improving partnerships between law enforcement leaders and university based researchers*. Washington, DC: International Association of Chiefs of Police.
Ingram, J. R., Terrill, W., & Paoline, E. A. III (2018). Police culture and officer behavior: Application of a multilevel framework. *Criminology, 56*(4), 780-811.
Kane, R. J., & White, M. D. (2009). A study of career-ending misconduct among New York City police officers. *Criminology & Public Policy, 8*(4), 737-769.
Krackhardt, D., & Porter, L. W. (1986). The snowball effect: Turnover embedded in communication networks. *Journal of Applied Psychology, 71*(1), 50-55.
Legewie, J. (2016). Racial profiling and use of force in police stops: How local events trigger periods of increased discrimination. *American Journal of Sociology, 122*(2), 379-424.
McCluskey, J. D., Terrill, W., & Paoline, E. A. III. (2005). Peer group aggressiveness and the use of coercion in police–suspect encounters. *Police Practice and Research, 6*(1), 19-37.
Moody, J. (2001). Peer influence groups: Identifying dense clusters in large networks. *Social Networks, 23*(4), 261-283.
Morselli, C. (2009). *Inside criminal networks.* New York, NY: Springer.
Muir, W. K. (1977). *Police: Streetcorner politicians*. Chicago, IL: University of Chicago Press.
Niederhoffer, A. (1967). *Behind the shield: The police in urban society*. Garden City, NY: Doubleday and Company.
Ouellet, M., Hashimi, S., Gravel, J., & Papachristos, A. V. (2019). Network exposure and excessive use of force: Investigating the social transmission of police misconduct. *Criminology & Public Policy, 18*(3), 675-704.
Paoline, E. A. III (2003). Taking stock: Toward a richer understanding of police culture. *Journal of Criminal Justice, 31*(3), 199-214.

Papachristos, A. V. (2009). Murder by structure: Dominance relations and the social structure of gang homicide. *American Journal of Sociology, 115*(1), 74-128.
Papachristos, A. V., Meares, T. L., & Fagan, J. (2007). Attention felons: Evaluating project safe neighborhoods in Chicago. *Journal of Empirical Legal Studies, 4*(2), 223-272.
Pastor, J-C., & Mayo, M. C. (1995). A network analysis of charismatic leadership: The case of a police department. *Academy of Management Proceedings, 1*, 327-331.
Quispe-Torreblanca, E. G., & Stewart, N. (2019). Causal peer effects in police misconduct. *Nature Human Behaviour, 3*(8), 797-807.
Reuss-Ianni, E. (1983). *Two cultures of policing: Street cops and management cops*. New Brunswick, NJ: Transaction Publishers.
Ridgeway, G. (2016). Officer risk factors associated with police shootings: A matched case-control study. *Statistics and Public Policy, 3*(1), 1-6.
Ridgeway, G. (2020). The role of individual officer characteristics in police shootings. *The ANNALS of the American Academy of Political and Social Science, 687*(1), 58-66.
Roberts, K. A. (2019). Correlates of law enforcement suicide in the United States: A comparison with army and firefighter suicides using data from the National Violent Death Reporting System. *Police Practice and Research, 20*(1), 64-76.
Rojek, J., Smith, H. P., & Alpert, G. P. (2012). The prevalence and characteristics of police practitioner-researcher partnerships. *Policy Quarterly, 15*(3), 241-246.
Rojek, J., Martin, P., & Alpert, G. P. (2014). *Developing and maintaining police-researcher partnerships to facilitate research use: A comparative analysis*. New York, NY: Springer.
Roithmayr, D. (2016). The dynamics of excessive force. *University of Chicago Legal Forum, 10,* 407-436.
Savitz, L. (1970). The dimensions of police loyalty. *American Behavioral Scientist, 13*(5-6), 693-704.
Scott, J. (2017). *Social network analysis, 4th Edition.* Thousand Oaks, CA: SAGE Publications.
Scott, J. & Carrington, P. J. (2011). *The Sage Handbook of social network analysis*. London: Sage Publications.
Sierra-Arévalo, M. (2019). The commemoration of death, organizational memory, and police culture. *Criminology, 57*(4), 632-658.
Skolnick, J. H., & Fyfe, J. J. (1993). *Above the law: Police and the excessive use of force.* New York, NY: Free Press.
Steglich, C., Snijders, T. A. B., & Pearson, M. (2010). Dynamic networks and behavior: Separating selection from influence. *Sociological Methodology, 40*(1), 329-393.
Terrill, W., Paoline, E. A. III, & Manning, P. K. (2003). Police culture and coercion. *Criminology, 41*(4), 1003-1034.
Valente, T. W. (1995). *Network models of the diffusion of innovations.* Cresskill, NJ: Hampton Press.
Valente, T. W. (2012). Network interventions. *Science, 337,* 49-53.
Van Maanen, J. (1973). Observations on the making of policemen. *Human Organization, 32,* 407-418.
Verbrugge, L. M. (1979). Multiplexity in adult friendships. *Social Forces, 57*(4), 1286-1309.
Wasserman, S., & Faust, K. (1994). *Social network analysis: Methods and applications.* London: Cambridge University Press.

Wood, G., Roithmayr, D., & Papachristos, A. V. (2019). The network structure of police misconduct. *Socius, 5,* 1-18.

Zhao, L., & Papachristos, A. V. (2020). Network position and police who shoot. *The ANNALS of the American Academy of Political and Social Science, 687*(1), 89-112.

Table 1. Officer demographics

	N	M / %	SD	Min	Max
Male	81	91%	-	0	1
Race/Ethnicity	77				
Black	40	52%	-	0	1
White	30	39%	-	0	1
Other	7	9%	-	0	1
Rank	82				
Police Officer	43	52%	-	0	1
Investigator	24	29%	-	0	1
Sgt/Lt/Captain	15	18%	-	0	1
Age	77	39.545	8.525	24	56
Tenure	63	12.921	7.905	2	33

Table 2. Officers with key network positions

	In-Degree (rank)					Betweenness (rank)			
Officer ID	Full Network	Friendship Network	Advice Network	Mentor Network	Officer ID	Full Network	Friendship Network	Advice Network	Mentor Network
A	11 (1)	3 (2)	6 (1)	2 (2)	**B**	.176 (1)	.071 (23)	.259 (1)	.0001 (2)
B	9 (2)	3 (2)	5 (2)	1 (3)	**W**	.137 (2)	.053 (32)	.048 (30)	-
C	9 (2)	3 (2)	3 (4)	3 (1)	**X**	.135 (3)	.112 (14)	.216 (2)	-
D	9 (2)	2 (3)	6 (1)	1 (3)	**Y**	.120 (4)	.096 (16)	.066 (20)	-
E	9 (2)	1 (4)	5 (2)	3 (1)	**Z**	.117 (5)	.303 (1)	.086 (13)	-
F	8 (3)	3 (2)	5 (2)	-	**D**	.117 (5)	.269 (2)	.157 (5)	.0001 (2)
G	8 (3)	3 (2)	5 (2)	-	**A**	.081 (12)	.033 (43)	.178 (3)	.0001 (2)
H	8 (3)	3 (2)	5 (2)	-	**CC**	.063 (15)	-	.160 (4)	-
I	8 (3)	1 (4)	4 (3)	3 (1)	E	.043 (28)	-	.046 (31)	.001 (1)
J	7 (4)	4 (1)	3 (4)	-	**AA**	.039 (32)	.246 (4)	.039 (37)	-
K	7 (4)	2 (3)	3 (4)	2 (2)	**BB**	.028 (41)	.159 (5)	.019 (50)	-
L	6 (5)	3 (2)	2 (5)	1 (3)	**O**	.019 (49)	.250 (3)	.008 (58)	-
M	6 (5)	3 (2)	3 (4)	-	P	.015 (51)	-	.009 (57)	.0001 (2)
N	6 (5)	2 (3)	2 (5)	2 (2)	C	.007 (58)	.065 (25)	.013 (53)	.001 (1)
O	5 (6)	3 (2)	2 (5)	-	I	.001 (64)	-	.020 (49)	.001 (1)
P	5 (6)	1 (4)	2 (5)	2 (2)	N	-	.031 (45)	.025 (45)	.0001 (2)
Q	4 (7)	4 (1)	-	-	K	.000 (65)	.001 (55)	.003 (62)	.0001 (2)
R	4 (7)	3 (2)	1 (6)	-	V	.000 (65)	-	-	.0001 (2)
S	3 (8)	3 (2)	-	-					
T	3 (8)	3 (2)	-	-					
U	3 (8)	3 (2)	-	-					
V	2 (9)	-	-	2 (2)					

Note 1. Officer IDs in bold fond identify officers who responded to the survey

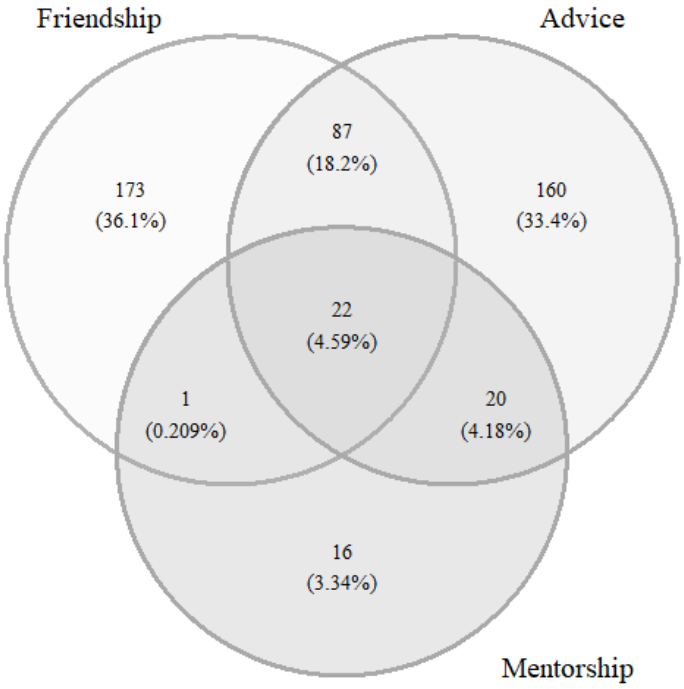

Figure 1. Multiplexity of officer relationships

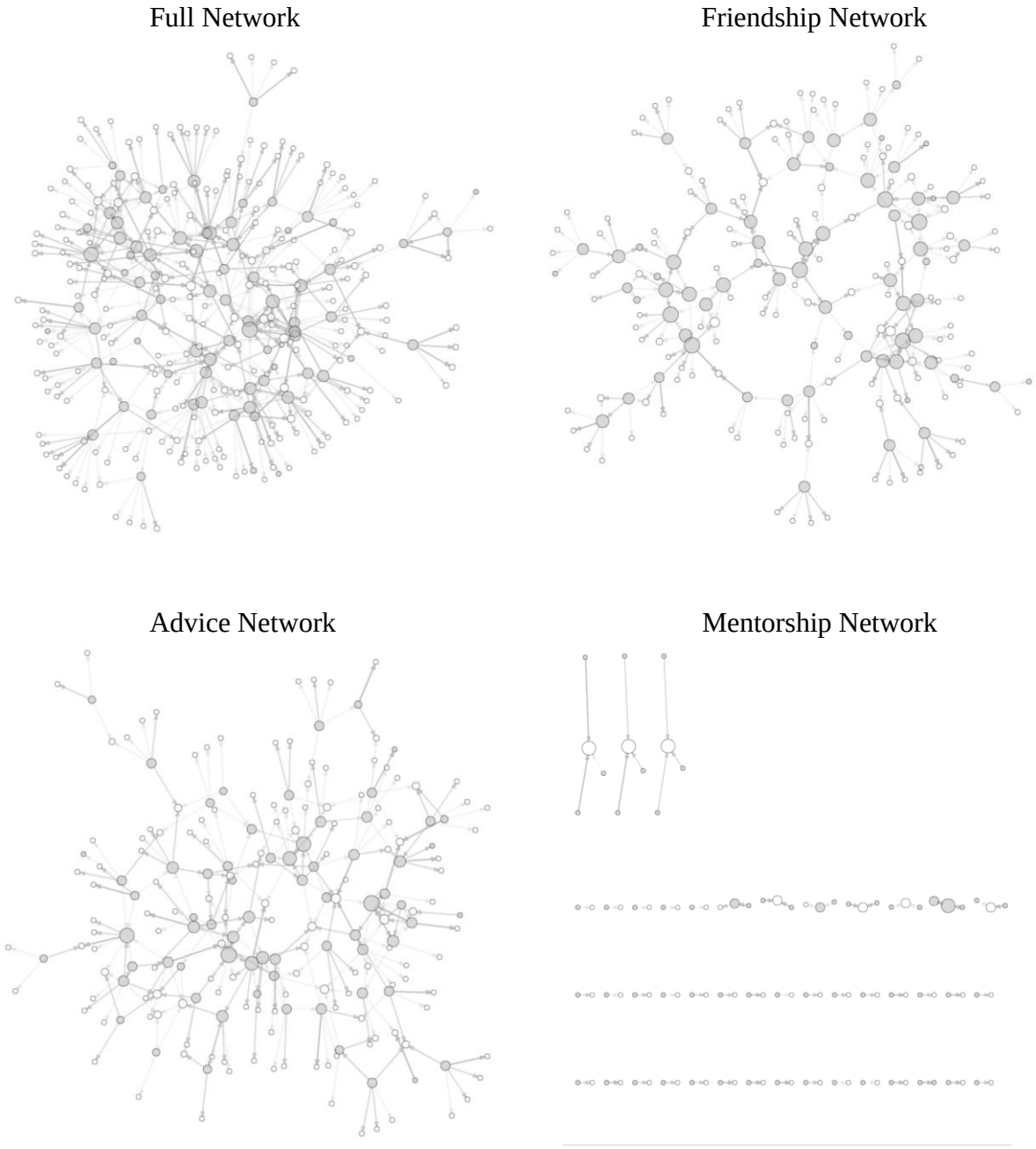

Figure 2. Network structure of informal officer relationships

Note 1. Networks are of the largest connected component for the full network (n = 309), friendship network (n = 208), and advice network (n = 209). The mentorship network visualizes all components (n = 100).

Note 2. Grey nodes indicate officers who took the survey, and white nodes officers who were nominated but did not take the survey.

Note 3. Edges denote friendship, professional advice, and mentorship nominations. Edge thickness represents multiplex relationships, where an officer nominated the same individual as more than one relationship type.

Note 4. Nodes are sized by degree centrality.