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Tragic, but not random: The social contagion of nonfatal gunshot injuries

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ABSTRACT

This study investigates the concentration of nonfatal gunshot injuries within risky social networks. Using six years of data on gunshot victimization and arrests in Chicago, we reconstruct patterns of co-offending for the city and locate gunshot victims within these networks. Results indicate that 70 percent of all nonfatal gunshot victims during the observation period can be located in co-offending networks comprised of less than 6 percent of the city's population. Results from logistic regression models suggest that as an individual's exposure to gunshot victims increases, so too do that individual's odds of victimization. Furthermore, even small amounts of exposure can dramatically increase the odds of victimization. For instance, every 1 percent increase in exposure to gunshot victims in one's immediate network increases the odds of victimization by roughly 1.1 percent, holding all else constant. These observed associations are more pronounced for young minority males, and effects of exposure extend to indirect network ties at distances of two to three steps removed. These findings imply that the risk of gunshot victimization is more concentrated than previously thought, being concentrated in small and identifiable networks of individuals engaging in risky behavior, in this case criminal activity.

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1. Introduction

Tragic acts of violence like the Sandy Hook shooting in Newtown, CT or the slaying of 15-year old Hadiya Pendleton in Chicago, IL redirect political and public attention towards gun violence. And, indeed, gun violence remains a pervasive problem. In 2010, the gun homicide rate in the United States (3.2 per 100,000) was more than three times higher than other industrialized democracies such as France (0.22), the United Kingdom (0.04), Canada (0.50), and Australia (0.09) and more akin to rates in countries such as Argentina (3.0), Uruguay (3.2), and Zimbabwe (4.7) (UNODC, 2011). Each year, more than 10,000 people in the U.S. are shot and killed by another person, and another 60,000 are treated for non-fatal gunshot injuries caused by assaults (CDC, 2012).

Statistics like these and images of innocent victims fuel the notion that violence is both pervasive and random. If gun violence can happen in an elementary school classroom or to an innocent adolescent girl standing in a public park with her friends, it can happen anywhere or to anyone. Yet tragic as these events and statistics are, gun violence is far from random. Gun violence is highly concentrated among particular segments of the population and in particular places. Young, minority males between the ages of 18–24 are the most likely victims of gun homicide, with rates of gun homicide more than fifty times higher than the overall U.S. average and ten times higher than white men in the same age range (Harper et al., 2007; Heron, 2007). Gun homicide also concentrates in small geographic areas within major U.S. cities, especially socially and economically disadvantaged neighborhoods (Braga et al., 2010; Jones-Webb and Wall, 2008; Peterson and Krivo, 2010; Weisburd et al., 2004).

While this uneven distribution by race and place provides insight into factors associated with elevated rates of victimization, it may inadvertently mask further disparities in individual risk. Cohort and cross-sectional studies consistently find that both violent victimization and offending tend to occur within small segments of populations of individuals actively engaged in delinquent and criminal activities (Kennedy, 1996; Loeber and Farrington, 2011; Thornberry et al., 2003; Wolfgang, 1958). Social network studies confirm such findings and further suggest that such populations are (a) fairly homogenous along traditional risk factors, (b) smaller than previously thought, and (c) readily identifiable through observational data (Papachristos et al., 2012a; Papachristos and Wildeman, 2014). Studies such as these imply that while risk factors play an important role in describing the distribution of gun

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violence across populations and places, they fare less well in explaining individual victimization or the concentration of violence within networks. In other words, our current explanations cannot explain why a specific young African American male in a high crime neighborhood becomes a murder victim while another young man with the identical risk factors does not. By failing to incorporate social networks into the analysis of gunshot victimization, we significantly misestimate the risk of victimization for individuals with seemingly identical risk factors.

Such a misestimation of the risk of gunshot injuries stems from two limitations: the overreliance on homicide data and the neglect of social networks. First, prior research relies almost exclusively on the analysis of gun homicides. Although homicide data tends to be extremely accurate because of the presence of an actual body and the amount of resources expended on homicide investigations, they are, statistically speaking, rare events. In fact, as the figures above suggest, there are roughly six non-fatal gunshot injuries for each gunshot homicide in the U.S. And, while research firmly establishes that gun homicides contribute to severe trauma and a host of negative health, educational, social, and economic outcomes for families and communities (Buka et al., 2001; Osofsky, 1999; Sharkey, 2010; Sharkey et al., 2012), very little research examines similar consequences and correlates of nonfatal gunshot injuries.

There is at least one other significant reason to more fully consider non-fatal gunshot injuries. On the most basic level, those who are shot but not killed represent an important—and dramatically understudied—vulnerable population within the public health community. Most directly, gunshot injuries account for significant reductions in life expectancy. According to one estimate, firearm injuries are responsible for a 151-day reduction in life expectancy for white males and a nearly one year (362-day) reduction in life expectancy for black males (Lemaire, 2005). In addition, nonfatal gunshot injuries reduce overall quality of life and contribute to sustained chronic health conditions. In a revealing ethnography of gunshot survivors in Philadelphia, Lee (2012) details the physical and mental health costs associated with gunshot injuries, including: physical disfigurement and disability, severe depression and anxiety, loss of employment, and long-term negative health consequences. For example, gunshot wounds to the abdomen can fundamentally transform how survivors perform basic bodily functions like the "ability to control and regulate how and where one defecates (or not)" and basic sexual functioning (Lee, 2012, pg. 249). Half of all the men interviewed by Lee (2012) lived with bullets or bullet fragments permanently lodged in their bodies that caused debilitating pain, stress, and anxiety that interfered with work and personal life. Effects such as these imply that the true cost of gun injuries, whatever that might be, greatly exceeds estimates obtained purely from homicide data.

Second, underestimation of the concentration of gun violence and individual risk of victimization may result from the failure to consider the importance of social networks. Despite the impression left by mass shootings that gun violence is perpetrated by strangers, nearly two-thirds of all gun homicides occur between individuals who know each other, suggesting that the context of social relationships is important in understanding the dynamics of gun violence (Decker, 1993; Smith and Zahn, 1999; Wilson, 1993). Recent network studies of gun violence in high crime communities underscore this point by demonstrating that the majority of gun homicides and non-fatal shootings occur within small, identifiable networks of individuals actively engaged in criminal and delinquent behavior (Papachristos et al., 2012a; Papachristos and Wildeman, 2014). For example, a study of one high-crime neighborhood in Boston found that 85 percent of all gunshot injuries occurred within a single network containing only 763 individuals—less than 2 percent of that community's population—a third of whom were gang members and a third of whom had an arrest in the months leading up to their victimization (Papachristos et al., 2012a). However, we know very little about how the contours of networks actually shape the risk of victimization, as this research is still in its infancy.

Focusing on non-fatal gunshot victims may also shed light on the reasons *why* gun violence concentrates within these networks. The clustering of gunshot victims in networks of active offenders demonstrates that the victims themselves are engaged in risky behaviors conducive to violence. The same is probably also true of the offenders, as victim and perpetrator are virtually indistinguishable along standard risk indicators and criminal histories (Berg et al., 2012; Braga, 2003). Gun assaults and homicides are the end result of dynamic interactional process between two (or more) individuals, and, indeed, the "victim" is the individual who received the injury but may in fact have been the instigator of the interaction (Luckenbill, 1977; Miethe and Regoeczi, 2004). If gunshot survivors continue to engage in the risky behaviors that placed them in the network in which they were victimized, then it is possible that they may also continue to engage in violent behavior that places others at risk of victimization. In short, they may very well "pass on" violence within their networks—a process consistent with qualitative research on the norms of retaliation and respect among males in high-crime communities (Anderson, 1999; Fagan and Wilkinson, 1998; Jacobs and Wright, 2006). As a case in point, a recent study of gang networks in Chicago and Boston finds that gang homicides are driven by norms of retaliation, organizational memory, status seeking behaviors, and other network processes (Papachristos et al., 2013). In the case of homicide, the victim is deceased, and the group seeks retaliation. The survival of gunshot victims may amplify such processes.

The present study has two objectives. First, we analyze the distribution of non-fatal gunshot injuries across high-risk networks in the entire city of Chicago. More specifically, we determine the extent to which non-fatal gunshot injuries concentrate and cluster within networks of individuals involved in risky behaviors, in this case incidents of co-involvement in a crime that leads to an arrest. We maintain that co-offending networks provide conservative estimates of the types of risky behavior that heightens an individual's exposure to situations, behaviors, and people that might elevate the probability of victimization. To date such studies rely on small samples or data for a single community (Papachristos et al., 2012a; Papachristos and Wildeman, 2014). Our study is the first to examine such networks for the entire co-offending population of a city and, thus, provide more accurate estimates of the true distribution of risk in a large city and over an extended period of time.

Our second objective is to assess whether or not the distribution of gunshot injuries in co-offending networks is associated with processes of *social contagion*—the extent to which one's probability of victimization is related to direct and indirect exposure to gunshot victims in one's social network. Other risky health behaviors—such as smoking (Christakis and Fowler, 2008; Mercken et al., 2009), alcohol and substance abuse (Fujimoto and Valente, 2012; Russell et al., 2002), obesity (Christakis and Fowler, 2007), and contracting an STD (adams et al., 2013; Morris, 1993)—are susceptible to peer influence. There are several reasons why gunshot victimization might be related to risky social networks. First, as just described, gun violence tends to concentrate within small groups and populations of active offenders (Braga, 2003; Papachristos et al., 2012a). Although we know little about the network structure of co-offending populations, group processes and peer influence have long been associated with the facilitation of crime and delinquency above and beyond individual selection (Warr, 2002). Second, norms surrounding gun use and gun carrying are associated with interactive and performative aspects of social life,

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