



Original article

Youth's Daily Activities and Situational Triggers of Gunshot Assault in Urban Environments

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Article history: Received March 24, 2017; Accepted June 28, 2017

Keywords: Gunshot assault; Momentary analysis; Risk profiles; Routine activities; Community-based intervention

A B S T R A C T

Purpose: Although previous research has made progress in identifying individuals predicted to face an elevated risk of being shot, it is not clear how that risk varies within individuals based on the contexts they encounter as they navigate daily life. The current study examines how the convergence of individual risk activity and neighborhood disadvantage and disorder triggers the risk of being shot.

Methods: Using a novel geographic information system application, 123 male gunshot assault victims between 10 and 24 years old in Philadelphia, Pennsylvania, described their minute-by-minute movements over the course of the day of the gunshot assault. Through latent class analysis, the primary exposure was real-life circumstance where nine theoretically informed risk factors converged, compared with two other circumstances. Case-crossover analyses of subjects' 10-minute segments of full-day activities compared gunshot assault victims at the time of assault with themselves earlier in the day.

Results: Compared to when individuals were exposed to minimal situational risk or were mainly exposed to neighborhood disadvantage and disorder, the concurrence of risk activity and neighborhood disadvantage and disorder was associated with a 9.90 (95% CI: 2.72–36.14) and 6.06 (95% CI: 2.78–13.22) times higher risk of being shot. Importantly, the likelihood of being in the high-risk circumstance increased systematically over the course of the day leading up to the time when young individuals were shot.

Conclusions: After controlled individual's propensity to be shot (e.g., inherent traits), the concurrence of situational risks emerged as significant triggers of gunshot assault. The findings suggest potential for community-based gunshot violence interventions.

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IMPLICATIONS AND CONTRIBUTION

This study investigates proximal predictors of gunshot assault from a within-person angle. These results advance our understanding of gunshot assault from a real-time, real-life standpoint and identify priority factors that can be targeted to confer protection for youth as they travel through the urban environment.

Conflicts of Interest: The authors have no conflicts of interest to disclose.

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Gun-related homicide kills approximately twelve 10–24 years old each day; 75 others were treated in emergency departments for assault-related gunshot nonfatal injuries [1,2]. Such problems disproportionately affect males overall and African-American males in particular and are largely an urban phenomenon [3]. Correlates of youth violence have been identified at the

individual, family, peer/school, community, and societal levels [4–7], including alcohol or drug use, neuropsychological deficits, chronic stress from exposure to violence, poor parent-child relationship, family conflict, and living in disadvantaged, disordered neighborhoods [8]. Being relatively stable, these factors can help identify individuals predicted to face an elevated risk of being shot and inform preventive interventions. Equally important are efforts to identify how the likelihood of being shot varies within individuals, even those at generally high risk, based on the contexts they encounter as they navigate daily activities.

Situational theories of crime suggest that proximal predictors of violent assault are found within individuals' immediate contexts [9]. According to routine activities theory, most criminal acts require convergence in space and time of likely offenders, suitable targets, and the absence of capable guardians [10,11]. Knowing the situational context of where individuals are, whom they are with, and what they are doing is crucial, then, to understand why an individual is assaulted at a particular location and time rather than another [12]. From an emergent transactional perspective, these situational or compositional factors also partially determine the schemas or scripts that youth bring into, and modify within, violent contexts and have important influence on the development and outcome of violent exchanges [13–15].

Research on situational correlates of crime and violence has identified six individual activities that are likely to increase an individual's likelihood of being assaulted, in particular, in the context of youth-on-youth street violence: presence of friends, absence of guardians (e.g., without adult family members), being in public/outdoor space, involvement in unstructured activities (e.g., wandering around without any purpose), weapon carrying, and substance use [16–21]. Yet no studies have monitored youth over time in a fashion that would enable an explicit test of whether risk is elevated during the convergence in time and space of these factors. Moreover, individuals' routine activities are embedded in a neighborhood context. Low socioeconomic status (SES), dilapidation (e.g., vacant properties), and opportunities for crime (e.g., the presence of alcohol outlets or vandalism) render a community incapable of maintaining effective social controls, thus attracting crime-prone individuals to the neighborhood and driving out the least deviant [22]. Neighborhood connectedness or collective efficacy (e.g., sense of belonging and mutual trust) can confer protective effects and also mediate the adverse contribution of structural disadvantage to violence [23–25].

Two obstacles have impeded empirical investigations of situational violence prevention. First, situational risks seldom operate in isolation but interact with each other to predict gunshot assault. Rather than modeling individual variables, a holistic approach is required that constructs risk profiles that map onto the multifaceted real-life situations individuals encounter [26,27]. Second, given the short induction period for time- and location-specific exposures for assault, momentary data are required that reveal how exposures emerge or subside intermittently during individuals' lived experiences. Although victims of assault are found more likely to engage in high-risk activities than nonvictims [16,21], previous work has not been able to establish whether violence erupts during specific, often fleeting moments when individuals are conducting high-risk activities.

We developed a novel approach that captured information on youths' step-by-step movements over a full day, up to and including the time when they were assaulted. Through latent class analysis (LCA), our analyses investigated when and how situational characteristics converged over the course of each

individual's activities at specific locations and times and whether these instances triggered the risk of being shot [28].

Methods

Study sample

We conducted the Space-Time Adolescent Risk Study in Philadelphia, Pennsylvania, which enrolled 123 gunshot assault victims, 175 victims of nongunshot assault, and 274 community controls between 2005 and 2009. All were male and between 10 and 24 years old. The assault victims were enrolled from the emergency departments of a pediatric and an adult level 1 trauma center located adjacently in central Philadelphia. Details of the methods of study have been reported previously [29]. In the current investigation, we analyzed only the gunshot cases and used a case-crossover approach, in which participants act as their own control. This approach minimized the possibility that time-invariant characteristics of the individuals would bias results. The study was approved by the institutional review boards of the University of Pennsylvania and The Children's Hospital of Philadelphia.

Data collection

A trained interviewer administered a geographic information system–assisted survey to each subject at our research office, at the subject's home, or in the hospital, on average 4 days after being shot. Each subject sequentially described his activities by time and location for the day they were shot, starting from the time of waking up. Whenever the subject reported a change in location or activity/behavior, a new data point was added into the geographic information system application with attribute information including time, companions, activity, indoors or outdoors, transportation mode, weapon carrying, substance use, and location latitude and longitude. Through drawing points on the street map, the interviewer created a graphic that provided a detailed record of how, when, where, and with whom the subject spent time over the course of the full day as he walked or otherwise traveled from location to location and from activity to activity up until and including the time of being shot. We divided each participant's data record into sequential 10-minute segments for analysis.

We accessed geographic data for the city of Philadelphia from the US Census, the Philadelphia Housing Authority, the Philadelphia Police Department, and the Philadelphia Health Management Corporation's Southeastern Pennsylvania Household Health Survey. We converted each geographic variable to a raster map layer that spanned the entire area of Philadelphia. Each variable, measured on a continuous scale, represented the prevalence or nature of each characteristic at any specific location. We considered this a better approach than taking values aggregated within arbitrary administrative units (e.g., Census block groups). By appending these geographic data by latitude and longitude to each path point of each subject's activities, we derived estimates, with high spatial and temporal specificity, of the exposure history experienced by each subject.

Situational risk measures

All situational factors that subjects experienced over the course of their reporting period were classified as dichotomous

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