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Victim Characteristics, Situational Factors, and the Lethality of Urban Gun Violence

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Abstract

The objective of this study is to hone in on the contextual, social, and individual characteristics that influence lethal outcomes across shootings. Although most criminological research focuses on differential outcomes for gun violence relative to nongun violence, we argue that great insight can be drawn through examining shootings in isolation. We focus on five ways that shooting outcomes vary: the number of shots fired, the number of times the victim was hit, where the victim was hit, the number of victims that were hit, and whether the shooting resulted in a fatality. Building on the adversary effects hypothesis and public health research on the impact of gunshot wound volume and location, we examine the factors that account for variation across shooting outcomes. Our analysis of data from the Rochester Shooting Database suggests that both adversary effects and random factors influence shooting outcomes. In addition, the results also reveal that adversary effects are more important during some stages of a shooting than others. The implications of these findings are discussed.

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Introduction

Since the monumental work of Zimring (1968), criminologists have been interested in the link between gun violence and fatal outcomes (Cook, 1982; Kleck & McElrath, 1991; Wells & Horney, 2002; Zimring & Hawkins, 1997). Criminological research on this topic has often focused on lethality effects, but has also considered how adversary effects (Felson & Messner, 1996; Felson & Pare, 2010a) and event dynamics (Weaver et al., 2004) shape violence. Public health research in this area has examined how the number and location of gunshot wounds influence the likelihood of a fatality (Carr, Schwab, Branas, Killen, & Wiebe, 2008; Grommon & Rydberg, 2015). Taken together, this research has expanded knowledge about the factors that influence the outcomes of gun violence.

Despite the advances that have been made, important gaps in the literature remain. These gaps center on two facts about most criminological research on this topic. First, this research primarily has focused on outcomes for gun violence relative to nongun violence. This has led to a dearth of understanding about the factors that drive variation in outcomes across shootings. Shootings vary across important outcomes: how many shots were fired, how many times (if any) the victim was hit, where the victim was hit, how many victims were shot, and whether or not the victim dies as a result of the shooting. Existing research has not yet accounted for why we might expect differences in outcomes across shootings. Nor have we identified the situational and contextual factors that might drive variation in such outcomes.

Second, criminological research on the lethality of violence has largely ignored public health research that has found that the number and location of gunshot wounds shape outcomes for violent events (Beaman, Annest, Mercy, Kresnow, & Pollock, 2000; Carr et al., 2008; Cripps, Ereso, Sadjadi, Harken, & Victorino, 2009; Grommon & Rydberg, 2015). As a result, little work has been done to incorporate findings from public health research into the existing criminological discourse. As such, we do not understand the extent that victim characteristics and situational factors account for the number and location of gunshot wounds that a victim receives. Nor do we understand the implications that this has for the lethality of violence.

The objective of this study is to hone in on the contextual, social, and individual characteristics that influence lethal outcomes across shootings. An analysis that examines shootings in isolation—while also incorporating

findings from public health research—can expand the existing theoretical landscape. One avenue for exploration—and the approach taken here—involves extending the adversary effects hypothesis to account for variation across shootings (Felson & Messner, 1996; Felson & Painter-Davis, 2012; Felson & Pare, 2010a). Proponents of the adversary effects hypothesis argue that victim characteristics and situational factors drive the offender's intent to use lethal violence. To date, this theoretical perspective has been utilized to compare lethal outcomes for both gun and nongun violence. Using data from Rochester, New York, we extend the adversary effects hypothesis to account for how victim characteristics and situational factors explain variation in shooting outcomes.

Adversary Effects and Violence

Research by Felson and colleagues on adversary effects (Felson & Messner, 1996; Felson & Pare, 2010a) provides a basis for understanding the factors shape outcomes across shootings. The adversary effects hypothesis suggests that the features of the incident—notably victim characteristics and situational factors—shape the willingness of the offender to use lethal force during violent altercations. Proponents of the adversary effects hypothesis argue that violence is purposive, and that offenders who carry out assaultive violence value the harm that the victim incurs (Felson & Messner, 1996). Harm is conceptualized as a means to some end and all aggression is viewed as instrumental or goal oriented in nature. As such, lethal outcomes in violent incidents are viewed as the result of offender intent, and offender intent to use lethal force is thought to be systematically related to other features of the event.

Although Felson and colleagues view violence as both purposive and instrumental, they acknowledge that the process by which actors reach lethal intent is bounded by strong emotion and a constricted time frame. The result is lethal action that is often quick, careless, and based on incomplete information. Felson and Messner (1996) noted that the link between offender intent and event outcomes is imperfect, but suggested that lethal intent at least increases the likelihood of a killing. Thus, those factors thought to lead to the formation of lethal intent should be more common for lethal violence than nonlethal violence.

According to Felson and Messner (1996), offenders consider two potential costs before carrying out an attack: those imposed by third parties and those imposed by the target. Third parties can provide a source of guardianship for the victim, so criminal aggression is less likely to be carried out when capable guardians are present. Target-imposed costs involve the potential harm that

can be inflicted on the offender by the victim. Upon consideration of potential costs, there are several reasons why an offender might prefer to kill a victim. First, the offender may fear victim retaliation. Second, the offender might seek to prevent the victim from testifying against him. Third, the offender may feel that the victim's transgression(s) warrants death. Finally, the offender may kill the victim for practical reasons, such as preventing him from competing in the drug trade.

Felson and Pare (2010a) noted that adversary effects may prove particularly deadly in urban settings. In socially disadvantaged neighborhoods where the code of the street prevails, residents may adopt an aggressive stance to ward off potential victimization (Anderson, 1999). This aggressive stance, however, contributes to the escalation of violent disputes. This problem is further exacerbated by the fact that assaults that occur in socially disadvantaged neighborhoods are more likely to involve guns (Baumer, Horney, Felson, & Lauritsen, 2003). The combination of aggressive actors and the proliferation of guns lead to a contagion of violence, where actors on both sides arm themselves in attempt to deter anticipated gun victimization (Blumstein, 1995, 2000).

Research generally has been supportive of the adversary effects hypothesis. Felson and Messner (1996) found that victim characteristics influence whether a violent encounter had a lethal outcome. More specifically, Black victims, male victims, and victims who were known to the offender were more likely to be killed. In addition, encounters that involved single offenders were more likely to have lethal outcomes than encounters with multiple offenders. Based on the assumption that Black and male victims are viewed by offenders as being more dangerous, and that single offenders and offenders known to the victim will be more fearful of potential retaliation; Felson and Messner concluded that tactical concerns, fear of retribution, desire to eliminate rivals, and the desire to gain status increase the likelihood that an offender will have lethal intent during a violent altercation. Similar support for the adversary hypothesis was also found by Felson and Pare (2010b), who found that both Blacks and Whites were more likely to use guns when they kill White southerners than when they kill White-northerners. Felson and Pare also found that—controlling for race and gender of offender—offenders were more likely to use guns when they assault Blacks. Based on these findings, Felson and Pare (2010b) concluded that offenders were more likely to kill Blacks and Southern Whites because they were believed to be more likely to be carrying weapons and more prone to retaliation.

To date, research on the adversary effects hypothesis primarily has focused on lethal outcomes for both gun and nongun violence, but the unique features of urban gun violence warrant the application of the adversary effects

hypothesis to an examination of gun violence in isolation. Research has shown that the increase in gun assaults in urban settings has increased weapon carrying and contributed to the contagion of violence in urban communities (Fagan & Wilkinson, 1998). Guns are now involved in the overwhelming majority of homicides in urban settings (Smith & Cooper, 2013). Although gun violence is ever-present and weapon carrying is pervasive in some urban communities, intent to kill a victim varies across shooting incidents (Phillips & Maume, 2007; Wells & Horney, 2002). Some offenders may truly intend to kill their victim, but others may only intend to scare their victim or send a message, while others may be so bound by feelings of rage or anger that they do not have clear intentions. This variation in offender intent is at least partially driven by the threat posed by the victim and levels of guardianship in the location where the shooting occurs. This may result in differential behaviors for offenders that may correlate with particular shooting outcomes.

It is also likely that victim characteristics interact with situational factors to shape the tactical considerations of the offender. In particular, we propose that victim weapon carrying will lead to increased odds of fatality for Black victims, Latino victims, young victims, gang affiliated victims, and crime prone victims. This is due to the fact that victims with these characteristics will be viewed by offenders as being more dangerous. Furthermore, offender concern about victim characteristics will likely be heightened if the victim possesses a weapon. We focus on the role of weapon possession because youth who carry weapons for protection are more likely to engage in subsequent crime (Lizotte, Krohn, Howell, & Tobin, 2008; Varano, Huebner, & Bynum, 2011; Watkins, Huebner, & Decker, 2008). Furthermore, previous research has found that the introduction of weapons into violent altercations leads to the escalation of violence (Wilkinson & Carr, 2009). These facts—when examined in light of Felson and Messner's (1996) arguments about victim characteristics and tactical consideration of the offender—lead us to reason that the salience of particular victim characteristics is enhanced when the victim possesses a weapon.

What is less clear, however, is those shooting outcomes that should be most strongly associated with adversary effects. Examining shootings across different stages sheds light on the difficulty associated with this issue. The decision to pull the trigger and the number of shots fired are in direct control of the offender. Thus, we might expect a stronger association between adversary effects and those shootings outcomes. Offenders have less control, however, on how many times the victim is hit and where, and both of these factors influence the likelihood that a shooting results in a lethal outcome. Regardless of the intentions of the offender, if they have poor aim or are under duress they may be unable to successfully carry out their task. Even seasoned professionals have

difficulty hitting their target in violent events. A 2008 *New York Times* analysis of New York police officer hit ratios in 2006 found that New York police hit their targets 34% of the time (Baker, 2008). It is unlikely that street offenders have the shooting acumen of New York's finest. This notion is supported by research by Wells and Horney (2002), who found that gun attacks were less likely to result in injury than nongun attacks because of poor offender aim. The question is whether offender aim is so significant that it renders the decision to shoot and the number of shots fired totally irrelevant.

The Present Study

Based on the discussion above, we test three research questions that address the link between adversary effects and shooting outcomes.

Research Question 1: To what extent do adversary effects influence shooting outcomes?
Research Question 2: Are adversary effects more salient at different stages of a shooting? Stated differently, do adversary effects influence some shooting outcomes but not others?
Research Question 3: Do particular adversary effects interact to increase the likelihood that a shooting results in a fatality?

Method

Data

Data for this study come from the Rochester Shooting Database (RSD). The RSD contains data for all assault shootings that occurred in the City of Rochester, New York, from January 2010 to July 2013. For each assault shooting, data were collected on the location of the shooting, the circumstances preceding the shooting, the characteristics of the victim and the offender, and whether or not the victim was killed as a result of the shooting. Information for each shooting was collected from crime reports and other investigative documents. Student coders—assisted by crime analysts at the Monroe Crime Analysis Center—entered data from these sources into the database. To ensure validity and reliability in the coding process, extensive training of coders was performed both before and during the coding process. In addition, tests of interrater reliability were performed throughout the coding process to ensure that the phenomena of interest were measured reliably. In general, the percent agreement and kappa scores were consistently above the thresholds established by Hartmann (1977) and Landis and Koch (1977).

In total, data were collected for 595 shootings. Due to missing data for some values, 580 incidents were analyzed here.

Measures

Measures were examined in consideration of the theoretical arguments made in this article and in recognition of the important control variables established in previous research. The measures examined here were divided into three categories: shooting outcomes, victim characteristics, and situational characteristics.[1] The shooting outcome variables examined here are fatality, disproportionate shots fired, victim shot multiple times, head shot, body shot, extremities, and multiple victims. All of the shooting outcome indicators are dichotomous and coded 1 when the outcome is yes and 0 when the outcome is no. Fatality is an indicator of whether or not the victim died as a result of the shooting. Disproportionate shots fired is an indicator of whether an above average number of shots were fired during the shooting incident.[2] Victim shot multiple times is a dichotomous indicator of whether or not the victim was shot 2 or more times. Shot in the head, shot in the body, and shot in the extremities are indicators of the location of the shooting.[3] Multiple victims is an indicator of whether two or more victims were shot during the incident.

The victim characteristics variables examined here are male, Black, Latino, youthful victim, crime prone victim, and gang affiliated victim. All of the victim characteristic indicators are dichotomous and coded 1 when the outcome is yes and 0 when the outcome is no. Male, Black, and Latino are indicators of the sex, race, and ethnicity of the victim, respectively. Young victim is an indicator of whether the victim was in the crime prone years of 16 to 25 when he or she was shot. Crime prone victim is an indicator of the victim's history of past criminality. Victims with exceptionally high criminal histories were coded 1 and all other victims were coded 0.[4] Victim gang affiliation is an indicator of whether the shooting victim was known to law enforcement as a gang member or gang associate prior to the shooting.

The situational characteristics examined here are staging area, dispute related, shot during robbery, drug location, drug trade, late night, victim had weapon, and many offenders. All of the situational characteristic indicators are dichotomous and coded 1 when the outcome is yes and 0 when the outcome is no. Staging area is an indicator of whether the shooting occurred at a bar, convenience store, or gas station. Dispute related is an indicator of whether there was any indication that the shooting occurred as a result of a dispute—regardless of the dispute type or duration. Shot during robbery is an indicator of whether the victim was shot during the occurrence of a robbery. Drug location is an indicator of whether the shooting occurred at an address

with two or more drug-related police contacts within the 12 months prior to the shooting. Late night is an indicator of whether the victim was shot between the evening hours of 7:00 p.m. and 3:00 a.m. Victim weapon is an indicator of whether the victim had a weapon when he was shot. Many offenders is an indicator of whether two or more suspects were involved in shooting the victim.[5]

We also controlled for gun type in our analysis. Handgun is an indicator of whether a handgun or pistol was used during the shooting (1 = yes, 0 = no). Rifle is an indicator of whether a long gun was used during the shooting (1 = yes, 0 = no). Shotgun is an indicator of whether a shotgun was used during the shooting incident (1 = yes, 0 = no).

In Table 1, we report percentages for variables examined here. The first section examines victim characteristics. In all, 93% of the victims in the shooting database were male, 85% were Black, and 10% were Hispanic; 55% of our victims were between the ages of 16 and 25, and 36% of victims were gang affiliated. In addition, 19% of shooting victims were considered crime prone.[6] Percentages of the situational characteristics also shed light on the nature of lethal gun violence. In all, 9% of all shootings occurred at a staging area, whereas 21% occurred at a known drug location; 24% of shootings occurred as a result of the drug trade, and 60% of all shootings in the sample were dispute related; 64% of shootings occurred between the hours of 7:00 p.m. to 3:00 a.m. Victims were found with weapons in 7% of shootings, and 37% of shootings involved two or more offenders.

The fourth and fifth sections in Table 1 examine weapon type and shooting outcomes. Weapon type was ascertained for 412 of the 580 shootings examined here. The overwhelming majority of shootings involved handguns being discharged (85%). 6% of shootings involved rifles being discharged and 9% of shootings involved shotguns being discharged. 39% of shootings involved a disproportionate amount of shots fired. 25% of all shooting victims were shot multiple times. 15% of the victims were shot in the head, 43% were shot in the body, and 58% of victims were shot in the extremities.[7] 10 percent of all shootings had multiple victims and 13 percent of shootings ended with a fatality.

Analytic Strategy

The analysis plan in this study will proceed in three steps. First, we examine the effects of victim characteristics and situational factors on number of shots fired, number of times the victim was hit, location of gunshot wound, and number of victims. Second, we examine the effects of victim characteristics, situational factors, number of shots fired, number of times the victim was hit,

Table 1. Percentage Breakdowns for Variables of Interest.

	%
Victim characteristics	
Male victim	93
Black victim	85
Hispanic victim	10
Victim 16-25	56
Victim gang affiliation	36
Crime prone victim	19
Situational characteristics	
Staging area	9
Drug location	21
Drug trade	24
Dispute related	60
Shot during robbery	17
Late night	64
Victim had weapon	7
Many offenders	37
Weapon type	
Handgun	85
Rifle	6
Shotgun	9
Shooting outcomes	
Disproportionate shots fired	39
Victim shot multiple times	25
Shot in head	16
Shot in body	42
Shot in extremities	58
Multiple victims	10
Fatal	13

location of gunshot wound, and number of victims on the odds of fatality. Third, we examine the effects of the interaction terms between victim characteristics and victim weapon possession on the odds of fatality. This analysis was performed using logistic regression.[8]

Results

Table 2 reports odds ratios for models that examine the effects of key predictors on the number of shots fired during the incident, how many times

Table 2. Logistic Regression of Victim Characteristics and Situational Factors on Shooting Outcomes.

	Disproportionate Shots Fired	Victim Shot Multiple Times	Head	Body	Extremities	Multiple Victims Shot
Victim characteristics						
Male	0.60	1.39	0.29**	0.89	1.88	1.38
Black	0.89	0.80	0.65	0.85	0.99	0.46
Latino	0.90	0.88	0.71	1.15	1.14	0.73
Victim 16-25	1.02	0.73	0.77	0.83	1.21	1.06
Victim gang affiliation	1.06	1.20	0.72	1.29	0.91	1.26
Crime prone victim	1.13	1.60	1.22	1.03	0.83	0.53
Situational characteristics						
Staging area	0.91	1.46	0.59	1.29	0.92	0.95
Drug location	1.16	1.20	1.23	0.84	1.14	1.27
Drug trade	1.37	1.65*	1.82*	1.08	0.80	0.55
Dispute related	1.30	1.38	1.04	1.49*	0.74	1.81
Shot during robbery	0.21**	0.73	0.94	0.77	1.03	1.55
Late night	1.04	0.57**	0.98	1.32	0.80	0.83
Victim had weapon	2.47*	2.08*	0.36	1.76	1.02	2.02
Many offenders	1.53*	1.12	0.70	1.33	0.96	1.24
Disproportionate shots fired	—	3.33**	0.67	1.20	1.00	3.90**
Victim shot multiple times	—	—	1.70	2.76**	3.22**	0.60
Constant	0.83	0.15**	1.03	0.39	0.82	0.06**
Pseudo-R^2	.07	.12	.06	.07	.05	.09

*$p < .05$. **$p < .01$.

the victim was hit, where the victim was hit, and how many victims were hit. The results reported in Table 2 provide a partial examination of our first and second research questions: Do adversary effects influence shooting outcomes and are adversary effects more salient at different stages of a shooting than others? Disproportionate shots fired is the dependent variable in the first model. The odds of disproportionate shots being fired are 0.21 times lower for victims shot during the commission of a robbery. This makes sense considering the utilitarian nature of most street robberies. The odds of disproportionate shots being fired are 2.47 times higher when the victim also had a weapon. This suggests that intent to harm across shootings increases if the victim poses a risk to the suspect. The odds for disproportionate shots being fired also increased if two or more suspects were involved in the shooting. This is likely due to other offenders having weapons, or the result of other offenders acting as bystanders that encourage the shooter to increase the amount of harm they mete out. The pseudo-R^2 for this model is .07.

The second model in Table 2 examines the odds that a victim will be shot multiple times. Victims were likely to be shot multiple times in shootings where the suspect fired a disproportionate number of shots (odds ratio = 3.33). Victims were also more likely to be shot multiple times in shootings that occurred as a result of the drug trade (odds ratio = 1.52). Perhaps victims were more likely to be shot in shootings involving the drug trade because the victim and suspect are in close physical proximity to one another. The odds of being shot multiple times were lower for shootings that occurred in the evening hours (odds ratio = 0.57). This suggests that the cover of darkness may influence the accuracy of the shots fired. Interestingly, victims with weapons were more likely to be shot multiple times, and this effect held when controlling for the number of shots fired. This may reflect greater intent for offenders to harm victims with a weapon.[9] The pseudo-R^2 for this model is .12.

Model 3 in Table 2 examines the odds that a victim will be shot in the head. Only two of the independent variables examined here are statistically significant. Males have 0.29 times lower odds of being shot in the head than females. One explanation for this finding is that differences in the nature of male and female victimization result in females being placed in situations (i.e., domestic violence) where they are more likely to be shot in the head. In addition, victims who are shot during a drug transaction are 1.65 times more likely to be shot in the head. The pseudo-R^2 for this model is .06.

The fourth model in Table 2 examines the factors that influence the odds of a victim being shot in the body. Two of the independent variables—dispute related and victim shot multiple times—exhibit statistically significant effects and are in the positive direction. The odds of a victim being shot in the body are 1.49 times higher in dispute-related shootings and 2.76 times higher in shootings where the victim gets shot multiple times. The pseudo-R^2 for this model is .07.

The fifth model in Table 2 examines the odds that the victim would be shot in the extremities. The only indicator that affects the odds of being shot in the extremities is whether the victim was shot multiple times (odds ratio = 3.22). None of the other indicators exhibited statistically significant effects. The pseudo-R^2 for this model is only .05.

The last model in Table 2 examines the likelihood that multiple victims were shot. None of the victim characteristics influence the likelihood that multiple victims were shot. Only disproportionate shots fired exhibited statistically significant effects. When assailants discharge a disproportionate number of shots, the odds of multiple victims being shot increase by 3.90 times. The pseudo-R^2 for this model is .09.

The results reported in Table 3 provide additional clarity for our first and second research questions. The models reported here examine the manner

Table 3. Logistic Regression of Fatality on Victim Characteristics, Situational Factors, and Shooting Outcomes.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8[a]
Victim characteristics								
Male	1.78	1.67	1.60	2.88	1.58	1.92	2.45	2.65
Black	0.69	0.76	0.78	0.79	0.78	0.83	0.87	0.63
Latino	0.65	0.68	0.66	0.73	0.62	0.88	0.77	0.79
Victim 16-25	0.46*	0.47*	0.47*	0.49*	0.49*	0.47*	0.49*	0.40*
Victim gang affiliation	0.71	0.67	0.66	0.70	0.61	0.65	0.63	1.30
Crime prone victim	0.18**	0.16**	0.16**	0.14**	0.15**	0.11**	0.11**	0.09**
Situational characteristics								
Staging area	0.34	0.34	0.33	0.35	0.29	0.30	0.30	0.37
Drug location	1.12	1.07	1.06	1.07	1.20	1.28	1.26	1.08
Drug trade	2.16**	2.01*	2.10*	1.81	2.04*	2.19*	2.06*	2.04
Dispute related	1.97*	1.84	1.79	1.90	1.74	1.78	1.83	2.35
Shot during robbery	1.39	1.43	1.42	1.57	1.49	1.61	1.73	1.66
Late night	0.91	1.01	1.03	1.00	0.99	0.98	.98	1.10
Victim had weapon	2.25	2.13	2.00*	2.85*	1.87	2.35	2.46	2.54
Many offenders	0.62	0.64	0.62	0.68	0.57	0.61	0.59	0.51
Shooting outcomes								
Disproportionate shots	1.89*	1.55	1.44	1.74	1.53	1.83	1.73	1.75
Victim shot multiple times	—	2.27**	2.36**	2.06*	1.72	5.10**	3.12**	3.23*
Multiple victims	—	—	1.83	—	—	—	1.81	2.27
Shot in head	—	—	—	5.14**	—	—	4.83**	5.05**
Shot in body	—	—	—	—	2.75**	—	2.87*	1.81
Shot in extremities	—	—	—	—	—	0.09**	0.21**	0.13**
Rifle	—	—	—	—	—	—	—	0.58
Shotgun	—	—	—	—	—	—	—	0.52
Constant	0.10**	0.09**	0.09**	0.03**	0.06**	0.14*	0.03**	0.04**
Pseudo-R^2	.13	.15	.15	.21	.18	.27	.30	.33

[a]The number of observations for this model was 412. This is due to the fact that the type of gun used was only ascertained for 412 cases.
*$p < .05$. **$p < .01$.

that adversary effects influence the odds that a shooting results in a fatality. Model 1 is the baseline model that examines the effects of victim characteristics, situational characteristics, and disproportionate shots fired on the odds of fatality. Race and gender are not statistically significant. This finding is not surprising when considering that there is little variation in the victim characteristics across race and gender.[10] Shootings involving victims ages 16 to 25 are less likely to end in a fatality (odds ratio = 0.46). This may be due to greater resiliency of younger offenders. Surprisingly, victims with a history of criminal violence have 0.18 times lower odds of dying when being shot. On the contrary, victims shot in drug-trade-related shootings have 2.16 times higher odds of death as a result of being shot. In Table 2, it was reported that

drug-trade involved shootings have higher odds of victims being shot multiple times and being shot in the head. Furthermore, the effect of drug trade on fatality remains significant even when controlling for the number of times the victim was shot and location of the gunshot wound (see Models 3 and 4 in Table 2). It is plausible that drug-related shootings are more likely to result in a fatality because actors in such shootings may deem it necessary to kill the victim in attempt to send a message to would be competitors. Dispute-related shootings were also more likely to end in a fatality. This may suggest that assailants may have greater intent to kill when the shooting occurs as a result of the victim engaging in behavior that the suspect viewed as an affront to his honor or dignity. The pseudo-R^2 for this model is .13.

Models 2 and 3 of Table 3 report results of regression analyses with the victim shot multiple times, and multiple victims indicators added to the equations, respectively. The odds of fatality are 2.27 times higher for victims who are shot multiple times. This is likely due to the fact that, all other things being equal, being shot multiple times increases the likelihood that the victim will have damage to vital organs. Interestingly, the effects of disproportionate shots fired and dispute-related drop from significance once victim shot multiple times are added to the model. This suggests that the effects of both variables on fatality are mediated by victim shot multiple times. Actors who fire a disproportionate number of shots are more likely to hit their victim multiple times, which increases the odds of fatality. Furthermore, actors involved in dispute-related shootings may be motivated by a long-brewing grievance, or an affront against their honor, which increases their intent to harm the victim, leads to the victim being shot multiple times, and increases the odds of fatality. The pseudo-R^2 for this model is .15. The results from Model 3 in Table 3 reveal that shootings involving multiple victims do not have higher odds of ending in a fatality than shootings that only involve one victim. The pseudo-R^2 for this model is .15.

Models 4 through 7 report results from models that introduce the location of gunshot wound into the equation. In Models 4 to 6, shot in the head, shot in the body, and shot in the extremities are separately entered into the models, respectively. Each variable has a statistically significant effect on the odds of the shooting resulting in a fatality. In Model 7, the effects of all victim characteristics, situational characteristics, and shooting outcomes are examined simultaneously. The results reveal that the statistically significant effects hold when the number of shots fired and the location of the gunshot wound are all included in the model. The odds of a fatality are 3.12 times higher when the victim is shot multiple times, 4.83 times higher when the victim is shot in the head, 2.87 times higher when the victim is shot in the body, and 0.21 times lower when the victim is shot in the extremities. These findings reveal the

importance of gunshot wound location in determining the likelihood that a shooting results in a fatality. Interestingly, effects of the victim being shot multiple times hold even when controlling for the location of the gunshot wound. This suggests that being shot multiple times may have a cumulative effect on the body that operates independent of where the victim is shot. Several of the control variables also exhibit statistically significant effects. Victims with a history of violence were less likely to die in shooting incidents. Conversely, drug-trade involved shootings were more likely to result in a fatality. The pseudo-R^2 for Model 7 in Table 3 is .30.

In Model 7 in Table 3, dichotomous indicators for the type of weapon were entered into the logistic regression equation. This model was examined to ascertain the extent that weapon type influences the odds of weapon fatality. Neither shootings that involved shotguns nor shootings that involved rifles were more likely to increase lethality.[11] Rather, the number of times the victim was shot and the location of the gunshot wound remained the most important predictors of the odds that a shooting resulted in a fatality. The pseudo-R^2 for this model is .30.

In Table 4, results are reported for models that examine whether particular victim characteristics interact with victim weapon to increase the likelihood of a fatal outcome. The models were examined to assess our third research question, which asks whether particular adversary effects interact to influence the likelihood that a shooting results in a fatality. Model 1 of Table 4 examines the odds of fatality if the victim in the shooting was Black and possessed a weapon when the incident occurred. This multiplicative term has a statistically significant effect. The odds ratio for this interaction is 12.21. Black, weapon-carrying victims have substantially higher odds of being killed in a shooting. The effects of several important predictors discussed above still hold when the multiplicative term is added to the model. The pseudo-R^2 for this model is .32. Models 2 through 4 in Table 4 test interactions between victim weapon and Latino victim, young victim, and gang affiliated victim, respectively. None of the interaction effects in Models 2 through 4 exhibit statistically significant effects. Model 5 in Table 4 examines an interaction between crime prone victim and victim weapon. The odds of being killed during a shooting are 42.77 times higher for crime prone victims who were carrying a weapon during the shooting. The findings suggest that adversary effects interact to increase the likelihood of fatality.[12]

Discussion

The objective of this study was to examine the contextual, social, and individual characteristics that influence lethal outcomes across shootings. Guided by

Table 4. Logistic Regression of Fatality on Interaction Effects.

	Model 1	Model 2	Model 3	Model 4	Model 5
Victim characteristics					
Male	2.74	2.54	2.45	2.46	2.53
Black	0.57	0.83	0.87	0.85	0.81
Latino	0.78	1.15	0.77	0.76	0.77
Victim 16-25	0.47*	0.48*	0.50*	0.47*	0.46*
Victim gang affiliation	0.61	0.63	0.64	0.55	0.62
Crime prone victim	0.10**	0.11**	0.11**	0.11**	0.04**
Situational characteristics					
Staging area	0.27	0.28	0.30	0.31	0.29
Drug location	1.38	1.38	1.26	1.27	1.30
Drug trade	2.07	2.03*	2.06*	2.13*	2.14*
Dispute related	1.84	1.86	1.83	1.83	1.85
Shot during robbery	1.55	1.63	1.73	1.73	1.52
Late night	0.92	1.00	0.98	0.97	0.88
Victim had weapon	0.39	3.56*	2.50	1.68	1.50
Many offenders	0.64	0.64	0.59	0.60	0.62
Shooting outcomes					
Disproportionate shots	1.73	1.83	1.73	1.79	1.63
Victim shot multiple times	3.26**	3.24**	3.13**	3.08**	3.10*
Multiple victims	2.03	1.99	1.80	1.83	1.78
Shot in head	4.50**	4.43**	4.83**	4.74**	4.95**
Shot in body	2.76*	2.65*	2.87*	2.86*	2.70*
Shot in extremities	0.18**	0.18**	0.21**	0.21**	0.18**
Interactions					
Black Victim × Victim Weapon	12.21*	—	—	—	—
Latino Victim × Victim Weapon	—	0.08	—	—	—
Young Victim × Victim Weapon	—	—	0.96	—	—
Victim Gang Affiliated × Victim Weapon	—	—	—	3.22	—
Crime Prone Victim × Victim Weapon	—	—	—	—	42.77**
Constant	0.04**	0.03**	0.03**	0.03**	0.04**
Pseudo-R^2	.32	.31	.30	.31	.32

*p < .05. **p < .01.

the adversary effects hypothesis, and public health research on shooting outcomes, this study examined three research questions. First, to what extent do adversary effects influence shooting outcomes? Second, are adversary effects more salient at different stages of a shooting? Third, do particular adversary effects interact to increase the likelihood that a shooting results in a fatality?

The results reveal that adversary effects influence the number of shots fired, how many times the victim was hit, the number of victims hit, and whether the victim perished as a result of the shooting. Conversely, adversary effects were not found to influence where the victim was shot. These results suggest that adversary effects matter, but the degree of these effects varies across different stages of a shooting incident. The results also show that adversary effects interact to increase the likelihood of a shooting resulting in a fatality. In particular, Black victims and crime prone victims were more likely to be killed in a shooting when they were carrying a weapon during the incident. This suggests that particular adversary effects combine to have a devastating impact on shooting outcomes for certain types of victims.

The present findings advance understanding of the factors which contribute to shooting outcomes in a number of ways. First, using data from an urban context, the findings presented here provide insights into the complex dynamics of urban gun violence. Specifically, the present study examined a unique sample of shootings that involved victims who were male (93%), Black (85%), and between 16 and 25 (55%). Moreover, a substantial amount of the shootings examined were gang involved (36%) and/or dispute related (59%). Thus, the shootings examined here are representative of a context in which much shooting violence occurs—that within hypersegregated and disadvantaged communities in urban areas. Second, by including characteristics widely recognized in the public health literature to influence lethality of shootings, we were better able to control for some of the factors which contribute to shooting outcomes. Specifically, by controlling for the number of shots, location, and volume of wound impacts, we were able to eliminate some of the variability attributable to factors like shooter aim and shooting conditions. In doing so, we were able to better hone in on what contextual, social, and individual characteristics continued to influence lethal outcomes. Third, drawing on a broad array of variables, we were able to interpret the effects of various factors in relation to the adversary effects hypothesis. Fourth, and relatedly, we were able to demonstrate that the adversary effects hypothesis can account for variation in outcomes across shootings.

The findings from this study suggest that shooting outcomes are a product of a combination of random and nonrandom factors. Consistent with the adversary effects hypothesis (Felson & Messner, 1996; Felson & Pare, 2010a, 2010b), situations in which the victim posed a direct threat seemed to be of particular importance. The greater mortality of those involved in drug transactions is anecdotally supportive of instrumental intentions playing a critical role in lethality. In further support of the adversary effects hypothesis, robbery did not prove to have a significant influence on lethality, which is consistent with the differential instrumental objectives of the act. This suggests

that the intentions of the protagonist to seriously harm the victim in a shooting event are shaped both by utilitarian and tactical considerations. Importantly, and consistent with public health research, a large share of lethal outcomes can be explained by somewhat random factors deriving from the conditions of the shooting—that is, wound location. Adversary effects had virtually no direct impact on where a victim was hit, and location of wound was one of the most important predictors of fatality. This suggests that further efforts should be made to integrate findings from public health research into criminological explanations of violence.

Our findings also suggest that the tactical considerations of actors engaged in shooting events are also shaped by a combination of victim characteristics and situational circumstances. This study focused on potential interactions between victim possession of a weapon and victim characteristics. Fatal outcomes were more likely for Black victims who had weapons during the incident and crime prone victims who had weapons during the incident. It is notable that neither Black victim nor crime prone victim alone exhibited direct positive effects on fatality. We interpret these findings to suggest that particular victim characteristics only become salient to the offender when the victim is perceived to pose a clear and present danger. These findings point to the need to further explore how victim characteristics interact with situational factors to influence violence outcomes. In addition, these findings suggest that further theoretical development is needed to incorporate such complex interactions into criminological explanations of violence.

The models examined here offer a snapshot of how urban shooting events unfold. Actors in shootings may fire a disproportionate number of shots in an attempt to kill or ward off victims with weapons. This increases the likelihood that multiple victims are shot, that the victims will be struck multiple times, and die as a result of the shooting. The number of shots discharged, however, does not directly affect where the victim is shot. Furthermore, none of the victim characteristics or situational factors examined here exhibit consistent effects on gunshot location. This suggests that once a gun is discharged, the location of the wound, assuming the victim is hit, is somewhat driven by random forces. As such, the role of offender intent on shooting outcomes is likely attenuated by the unpredictable nature of urban gun violence.

A number of factors identified in the literature either contradicted or did not prove to be significant predictors of lethal outcomes in the present study. One of the most noteworthy contradictory findings is with regards to the influence of race and gender. Where Felson and Messner (1996) would predict that race and gender should have an influence on lethal outcomes, no direct race or gender effects were found in the present study. This finding is

likely due to the nature of the sample examined in this study. In all, 95% of the shooting victims in this sample were either Black or Hispanic and 93% of the victims were male. Data for which suspect race/ethnicity and gender information were available suggest that the offender makeup is similar to that of the victims. The shootings examined here reflect the hypersegregated urban context in which much urban violence occurs. Offenders in such contexts likely look for factors besides race and gender in isolation to determine victim dangerousness.

A number of other factors with no clear theoretical explanation also emerged. Both younger and more crime prone victims appeared to be more resilient to lethal outcomes, even when factors such as location of wound impact were controlled. This may be because younger individuals are generally physically healthier and thereby more likely to survive traumatic wounds. And, perhaps, more crime prone victims are more familiar with shootings by virtue of greater experience with associates surviving. These findings might also be an artifact of dynamics within hypersegregated contexts. Amid the "Code of the Street," it may be the case that offenders may believe that not killing young and criminally prone offenders would be useful in establishing a street reputation and "juice" which might be beneficial in warding off future attacks or affronts to the aggressor. In other words, if the word on the street is that one is armed and willing to exercise force, others may avoid aggravating these individuals.

Drug-trade-related shootings were also found to be an important predictor of shooting outcomes. Victims had higher odds of being shot multiple times, shot in the head, and dying in shootings that involved the drug trade. No direct explanation for this finding can be derived from the adversary effects hypothesis. Perhaps offenders in drug-trade-related shootings had greater intent to kill or seriously harm victims who had attempted to steal drugs from them or victims who were rivals in the drug trade. Future research is necessary to clarify the exact causal nature of these effects.

Taken together, these findings have implications for matters of diversity. Our data show that 95% of shooting victims were either Black or Hispanic. Even in a diverse city such as Rochester (2010 Census: 43.7% White, 41.7% Black, 16.4% Hispanic), this figure represents disproportionate representation of Blacks and Hispanics in shooting victimization. Furthermore, the finding that Black victims with weapons are more likely to be killed lends support to the notion that members of particular groups are viewed as being more dangerous in certain contexts. Without serious efforts to address the differential social conditions that place minorities at greater risk of gun violence, as well as the attitudes that promote the idea that members of particular minority groups are dangerous, Blacks and Hispanics will continue to face elevated risks of gun-violence victimization.

Limitations

As is the case with all research, the present study suffers from a number of limitations. First and foremost, the present data are limited in that lethal intent is an unobservable variable that must be inferred. This is a problem which is not unique to the present study, but shared in all research attempting to infer lethal intent from outcomes, as discussed by Felson and Messner (1996). At the same time, the present study offers a number of advantages over past research in making inferences about lethal intent, as it is the first to include controls for factors which have been established in the public health literature to correspond with lethal outcomes. With that said, no test of the adversary effects hypothesis is complete without explicit measures of offender intent.

Second, data are limited to one city in the northeast, making it difficult to generalize. Nonetheless, the context of Rochester is typical of many postindustrial urban disadvantaged contexts, and we have no reason to believe there is anything especially unique about shootings that occur there when compared to similar places. Given that this is a context in which much of gun violence occurs, this presents a unique opportunity to understand the dynamics of gun violence in this context. Likewise, it is arguable that the aforementioned limitation is also a benefit in that most other studies rely on larger national data sources which lack the unique detail available on situational factors in the present data. That being said, efforts to collect data and replicate the analyses presented here should be attempted in other regions and localities, and eventually nationally.

Third, the present study relies upon official reports to inform the contextual and situational factors for shootings known to the police. As such, the present data are subject to many of the widely cited criticisms of official data, especially the lingering possibility of a "dark figure" of shootings which the police are unaware of. Likewise, as with any complex interactional situation, many factors are subject to interpretation and despite the best efforts to ensure reliability and validity of coding, information for some cases was inherently limited to the intersubjective interpretation of coders or unknowable. Given this, future research should attempt to reconcile these findings against qualitative accounts of shootings which provide further insight into the potential dark figure of shootings.

Fourth, many of the models examined here only explained a small amount of the variation in the models. For instance, the pseudo-R^2s reported in Table 2 show that four of the five models examined explain less than 10% of the variation in shooting outcomes. This suggests that adversary effects alone cannot account for the processes of interest, and more work must be done to explain those processes that account for variation in outcomes across shootings. This

point notwithstanding, our full models that attempted to account for lethal outcomes produced pseudo-R^2s in the range of .27 to .33.

Conclusion

The objective of this study was to examine the contextual, social, and individual characteristics that influence lethal outcomes across shootings. Taken together, the present findings constitute a contribution to the understanding of factors which explain lethal outcomes for shootings. Specifically, controlling for shooting factors, we were able to better hone in on what effects persist after accounting for some of the error associated with shooting situations. Although some effects hold up and are supportive of the adversary effects hypothesis, the results also suggest that random factors seem to contribute to shooting outcomes. We hope that this research will generate further interest in determining the factors that influence variation in outcomes across shootings.

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Notes

1. In incidents where there was more than one shooting victim, data were reported for the victim with the most serious injuries.
2. This measure was calculated by taking the lowest reported number of shots fired for each incident, taking an average of that number, and assigning a 1 to each incident that had an above average number of shots fired. All other values were assigned a 0. If the number of casings recovered was higher than the number of shots reported, the number of casings recovered was used. The mean number of shots fired was 3.5, but the median of 3 was used here because a few outliers have inflated the mean. Thus, shootings were considered to have a disproportionate number of shots fired if four or more shots were fired in the incident. The range for the number of shots fired was 1 to 39, but 75% of shootings had five

or fewer shots fired and 90% of shootings were characterized by seven or fewer shots being fired.

3. Victims were considered to have been shot in the body if they received gunshot wounds to the thorax, pelvis, abdomen, spine, or back. Victims were considered to have been shot in the extremities if they were shot in the arms or legs during the incident.
4. This measure was created using a factor generated scale consisting of measures of (a) whether the victim had ever been arrested for possession of a controlled substance, (b) possession of a controlled substance with intent to deliver, (c) any violent offense, (d) any property offense, (e) criminal possession of a weapon, and (f) whether the victim had previously been on parole. The Cronbach's alpha for this scale is .68, and it loads on a single factor with an Eigenvalue of 1.54. This factor generated scale was standardized and transformed into a dichotomous variable with all victims with a score 1 standard deviation above the mean coded as 1 and all others coded as 0.
5. This is not an indicator of the number of gun men. Instead, this measure assesses the number of total suspects (shooters and nonshooters) involved in the incident.
6. A more specific breakdown of the criminal history of the shooting victims in our data set is as follows: 87.5% of all shooting victims had a previous criminal history at the time of the shooting incident; 40% of victims had been cited for possession of an illicit substance, 37% of shooting victims had been arrested for a violent crime, 46% had been arrested for a property crime, 27% had been arrested for criminal possession of a weapon, and 21% had previously been on parole.
7. Percentages for shooting location do not equal 100 because some victims were shot multiple times.
8. To ensure the validity of the results, extensive regression diagnostics were performed using STATA. The models presented here passed diagnostics for model fit, collinearity, and influential outliers. A correlation matrix examining the variables of interest is not shown here but is available upon request.
9. Alternatively, this finding may suggest that victims with weapons are more vulnerable because they are attempting to utilize their weapon to attack the suspect, rather than seek cover.
10. Due to the fact that our sample was overwhelming male, we tested the same models with a sample that only included male shooting victims. The results were substantively the same.
11. We examined multiple model specifications when examining the effects of gun type on odds of fatality. First, we examined models that explored the separate effects of handguns, shotguns, and rifles, respectively. We then examined models with different combinations of the gun type. Models could not be tested that included all three gun types together because of high levels of collinearity between the predictors. None of the models that we examined revealed differences in fatality by gun type. Although statistically discernible effects were not found, a closer look at the data reveals that the fatality rates were highest for

shootings involving handguns; 47 of the 351 shootings involving handguns were fatal (13.4%), three of the 36 shootings involving shotguns were fatal (8.3%), and three of the 25 shootings involving rifles were fatal (12%).

12. Due to the nature of the sample, we were unable to test an interaction between gender of the victim and possession of a weapon; 93% of victims in our sample were male, and 95% of all victims who were found with a weapon were male. This led to intolerable levels of multicollinearity when attempting to examine this interaction. In addition to the results reported above, we examined models that tested whether strangers had higher odds of being killed in a shooting. The results revealed that a shooting is less likely to result in a fatality when the suspect and victim are strangers (odds ratio = 0.30, significant at $p < .05$ level). This is not surprising when considering that a substantial amount of urban violence is the result of ongoing disputes between actors who are known to one another.

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