Exploring Incident-Based Crime Data:
The Environmental and Situational Correlates of Victim Injury Risk and Severity in Non-fatal Violent Incidents

Final Report

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INTRODUCTION

Partnerships between police agencies and academic researchers have yielded significant research findings documenting the non-random distribution of victimization across space, time, and individuals (e.g., Sherman et al., 1989). From a theoretical perspective, this research has contributed to the understanding of crime pattern development. From a policy perspective, understanding the factors which contribute to these crime patterns has been crucial for effective and efficient allocation of limited police resources. Despite the relevant theoretical and policy implications produced from previous research, few studies have examined the factors which impact victim injury during violent crime incidents.

Theoretically grounded empirical research consistently demonstrates that crime and victimization can be understood as a function of criminal opportunity affected by environmental and situational factors (e.g., Sampson, 1987; Sampson and Wooldredge, 1987; Wilcox Rountree, Land, and Miethe, 1994). We extend this logic by positing that such factors will also influence the nature and extent of violent victimization. In other words, we contend that victim injury risk and severity during crime incidents is not random, but rather a function of environmental and situational factors which define real and perceived opportunity. Not only do these factors influence the decision to offend, but they also affect offender behavior (e.g., inflicting injury on victims) during criminal incidents.

Official data have historically been collected and reported in summary form (e.g., Uniform Crime Reports), making incident-level analyses impossible. Some researchers have used victimization surveys, such as the National Crime and Victimization Survey (NCVS), to study victim injury. Such studies are useful for understanding victim characteristics which are associated with victim injury, but generally do not focus on additional incident-level factors

which might also contribute to victim injury during violent incidents. Studies which have used data collected at the incident-level generally have not featured incident-level analysis, instead examining victims as the units of analysis, potentially ignoring important incident-level effects. The present study uses data from the National Incident-Based Reporting System (NIBRS) to capitalize on the properties of incident-level data to explore the factors impacting victim injury risk and severity, grounding the analyses in environmental criminological theory. Environmental criminology suggests that environmental and situational factors shape how criminal incidents develop and unfold, potentially influencing the nature and extent of victim injury during criminal events.

Given the challenges facing local law enforcement agencies, enhancing understanding about the contextual factors that increase the likelihood and severity of victim injury is crucial for developing effective prevention policies. Police administrators must often make difficult decisions about the use of limited resources to deal with an array of crime problems. The current study aims to inform prioritization and allocation decisions by providing a more nuanced understanding of violent victimization.

PRIOR RESEARCH ON VICTIM INJURY

Research findings related to victim injury during violent incidents generally come from two data sources. A few studies have examined the risk of injury to victims of violence using data collected from victimization surveys, with most research on victim injury coming from the National Crime Victimization and Survey (NCVS) (formerly known as the National Crime Survey). In addition, a few researchers have examined victim injury using data from the

National Incident Based Reporting System (NIBRS). A summary of these research findings is presented below.

Findings from Victimization Surveys

Studies using data from the NCVS have examined victim injury within various contexts, including injury during intimate versus stranger assaults against females (Bachman & Carmody, 1994), among elderly victims of violence (Bachman, Lachs, and Meloy, 2004), during rapes (Martin and Bachman, 1998; Brecklin and Ullman, 2001), during robberies (Kleck and DeLone, 1993), and during gang-perpetrated crimes compared to other crimes (Melde and Rennison, 2008). Though these studies did not explicitly frame their research questions using an environmental criminological perspective, many examined the influence of some ecological factors either as part of their research questions or as control variables. The subsections below detail the influence of victim, offender, and event characteristics on victim injury based on research findings from the NCVS.

Victim Characteristics

Studies on victim injury using data from the NCVS have found mixed results with respect to the effects of victim characteristics on the likelihood and severity of victim injury risk. For example, several studies found no effect of victim age on injury risk (Kleck and DeLone, 1993; Martin and Bachman, 1998; Melde and Rennison, 2008), but Schnebly (2002) reports statistically significant findings with respect to victim age when considering injury severity. Specifically, multinomial logistic regression analyses indicate that younger victims (under 60 years of age) relative to older victims were more likely to sustain mild injuries compared to no injuries, but older victims were more likely to sustain serious injuries relative to mild injuries (Schnebly, 2002).

In terms of the effect of victim gender on victim injury risk, Melde and Rennison (2008) report that females were significantly more likely than men to be injured. In terms of victim injury severity, Schnebly (2002) reports that female victims were significantly more likely than male victims to be both seriously and mildly injured (relative to no injury). When injury did occur, however, the injury was more likely to be more serious for males. Research on victim injury with respect to victim race has also produced mixed results. While some studies report non-significant findings for victim race (e.g., Bachman & Carmody, 1994; Martin and Bachman, 1998; Melde and Rennison, 2008), Kleck and DeLone (1993) found that Black victims were less likely to be injured during robberies, while Schnebly (2008) found that Black victims were more likely to be injured.

Offender Characteristics

Similar to the findings for the influence of victim characteristics on victim injury, the influence of offender characteristics is also unclear. Some studies indicate that the presence of multiple offenders was associated with a greater likelihood of victim sustained injuries (e.g., Melde & Rennison, 2008; Schnebly, 2002). While Melde and Rennison (2008) found that offender age was not significantly related to victim injury, they did find significant effects of offender gender and race: victimizations involving female offenders and those involving non-White offenders were significantly more likely to result in victim injury. Schnebly (2002) reports that victimizations perpetrated by Black offenders were less likely to result in minor injury (relative to no injury), but when injury did occur, it was more likely to be serious. Melde and Rennison (2008) also report significant findings for victim-offender relationship, specifically that victimizations perpetrated by intimates, family members, and friends were more likely to result in victim injury relative to stranger perpetrated victimizations (but see Brecklin & Ullman,

2001 and Martin & Bachman, 1998 for null findings for victim-offender relationship in cases of rape). Although Schnebly (2002) found that victimizations involving offenders under the influence of alcohol or drugs had a greater likelihood of resulting in injury, and that the severity of injury increased, other studies reported no significant relationship between offender drug and alcohol use and victim injury (e.g., Bachman and Carmody, 1994; Brecklin & Ullman, 2001; Martin and Bachman, 1998).

Event Characteristics

To date, results are mixed as to the influence of event characteristics on victim injury risk and severity. For example, studies report diverging findings on the influence of location type. Brecklin and Ullman (2001) found no significant difference between rapes which occur indoors versus those which occur outdoors. Martin and Bachman (1998) found that rapes which occur in private are not significantly different with respect to victim injury, though Kleck and DeLone (1993) found that robberies which occur in private are significantly more likely to result in victim injury. Melde and Rennison (2008) found that victimizations occurring at a friend's home and other places are more likely to result in victim injury relative to those which occur in or near the victim's own home. Similar to location type, the influence of time of day is somewhat unclear. While Brecklin and Ullman (2001) report no significant effect of time of day for rapes, Kleck and DeLone (1993) report that robberies occurring at night are more likely to result in victim injury.

Finally, the influence of weapons during violent victimizations appears to be nuanced. Several studies report non-significant findings when the effects of weapons in general are estimated. Bachman and Carmody (1994), for example, found no significant effects for weapons during assaults against females by intimates, though weapons did increase the likelihood of

victim injury when the offender was a stranger. Both Brecklin and Ullman (2001) and Martin and Bachman (1998) found the relationship between presence of a weapon during a rape and victim injury to be non-significant. Studies which measured specific weapon types, however, do report a significant relationship between particular weapons and victim injury. Melde and Rennison (2008) found that the presence of a gun increased the risk of victim injury, while knives had no significant effect. Other weapon types also significantly increased the likelihood of victim injury (Melde and Rennison, 2008). Kleck and DeLone (1993) examined robberies specifically and found that the presence of firearms, knives, or other weapons all reduced the likelihood of victim injury. Similarly, Schnebly (2002) found that if the offender had a gun, the victim was less likely to be either seriously or mildly injured (relative to no injury) but it is more likely to be serious when injury occurs.

Findings from the National Incident Based Reporting System (NIBRS)

While most research on victim injury utilizes data collected from victimization surveys, a few researches have examined victim injury using data from the National Incident Based Reporting System (NIBRS). For example, Messner, McHugh, and Felson (2004) examined whether assaults motivated by bias (e.g., racial, religious, and disability) differ from other types of assault, including severity of victim injury. Though bias motivation was their key variable of interest, Messner et al. (2004) controlled for a number of situational and environmental variables in their analyses. Using NIBRS data from 1999 from eleven states (Colorado, Connecticut, Idaho, Massachusetts, Michigan, South Carolina, Tennessee, Utah, Vermont, Virginia, and West Virginia)[1], they estimated multinomial logistic regression models to determine the influence of bias motivation on victim injury severity during assaults, net of other factors. Assaults that were

[1] Messner et al. (2004) used the following criteria to select states for inclusion in their study: 1) states had to have a minimum of 25% of law enforcement agencies reporting to NIBRS, and 2) they had to have no fewer than 20 bias crimes on record.

motivated by racial, other, or unknown bias significantly increased the likelihood of major injury and, in terms of minor injury, assaults motivated by unknown biases were more likely to result in minor injury. Victim characteristics were also significantly related to victim injury severity. When compared to White victims, Black victims were significantly less likely to receive major or minor injuries. Victims age 16 to 25 were less likely to receive major injuries compared to victims of other ages, but more likely to receive minor injuries. In addition, male victims were less likely than female victims to sustain major injuries.

Messner et al. (2004) also report significant findings for two measured offender variables: 1) offender use of alcohol and drugs and 2) victim-offender relationship. Specifically, they found that offenders suspected of using alcohol were significantly less likely to inflict major injuries, while offenders who were suspected of using alcohol or drugs were both significantly more likely to inflict minor injuries. In terms of victim-offender relationship, family members, compared to strangers, were less likely to inflict major injuries and more likely to inflict minor injuries. Offenders that knew victims who were not a family member were more likely than strangers to inflict major as well as minor injuries on their victims.

D'Alessio and Stolzenberg (2009), guided by a racial animosity perspective, examined the effects of race on the likelihood of serious victim injury during interracial crimes. Using NIBRS data from 2005 collected from 134 cities with populations of 50,000 or more, they analyzed interracial robberies, rapes, and assaults and found that interracial robberies with multiple offenses, multiple offenders, male offenders, older victims, and male victims were more likely to result in serious victim injury. Those that occurred in cities with higher crime rates were also more likely to result in serious victim injury. Conversely, interracial robberies with multiple victims and those that occurred in cities with larger black populations were less likely to

result in serious victim injury. For interracial rapes, the risk of serious victim injury was significantly increased in cases with multiple offenders and older victims. In addition, those which occurred in Southern cities were significantly more likely to result in serious victim injury. Interracial assaults committed by multiple offenders, male offenders, and against male victims were also more likely to result in serious victim injury. Conversely, assaults which included deadly weapon, those committed by strangers, and those which included multiple offenses and victims were significantly less likely to result in serious victim injury.

Though these studies contribute to the knowledge base on victim injury, they do not fully capitalize on the incident-level nature of the data, but instead analyzed victims as the units of analysis (Messner et al., 2004; D'Alessio and Stolzenberg, 2009). Additionally, the theoretical perspectives which shaped respective research questions guided examinations of victim injury and operationalization of key constructs, thus distinguishing these prior analyses from the present study. In the following section, we describe the environmental criminological perspective which informs our analyses of victim injury risk and severity.

THEORETICAL PERSPECTIVE

The widespread movement toward problem-oriented policing in local law enforcement has moved police work away from traditional reactive practices toward a more proactive orientation. Problem-oriented policing advocates suggest that police should do more than simply respond to calls for service from citizens; rather, they should proactively work toward understanding and preventing crime (e.g., Eck and Spelman, 1987; Goldstein, 1979). Criminological research to date has aided in this endeavor, as empirical studies consistently demonstrate that victimization is non-randomly distributed across space (e.g., Sherman, Gartin,

& Buerger; Eck, Clarke, & Guerette, 2007; Astor, Meyer, & Behre), time (e.g., Polvi, Looman, Humphries, & Pease, 1991), and individuals (e.g., Hindelang, Gottfredson, & Garafalo, 1978; Lauritsen & Quinet, 1995). This well-established finding that the distribution of crime is not random has led to partnerships between law enforcement and criminologists to better understand the factors which influence crime patterns. If police can anticipate where, when, and to whom crime is most likely to occur, they can more effectively and efficiently allocate limited police resources for prevention.

The environmental criminological perspective – which includes the routine activities approach, the rational choice perspective, situational crime prevention, and crime pattern theory – suggests that physical environment and situational context shape perceived and actual opportunities for criminal behavior, thus accounting for the non-random distribution of crime (Wortley and Mazerolle, 2008). The routine activities approach suggests that crime incidents require three minimal elements to converge in time and space: 1) an offender who is prepared to commit the offense, 2) a suitable target, and 3) the absence of *controllers*, or anyone capable of preventing the crime (Cohen and Felson, 1979; Felson, 1986; Eck, 1994; Felson, 1995). Structural changes in societal routine activity patterns can influence crime rates by affecting the likelihood of the convergence in time and space of these three necessary elements. In other words, opportunities for crime, and in turn crime patterns, are a function of the routine activity patterns in society. Those who prevent crime, or controllers, include *guardians*, who protect targets from being victimized; *handlers*, who control offenders (Felson, 1986; 1995) and *managers*, who supervise places (Eck, 1994). Therefore, prevention implications drawn from the routine activities approach often focus on the utilization of these roles for prevention.

Per the routine activities approach, a suitable target is one of the necessary elements of crime events. Finkelhor and Asdigian (1996) describe three types of characteristics which contribute to target suitability: 1) target vulnerability – the lack of ability to resist or deter crime, 2) target gratifiability – the qualities, possessions, or attributes offenders desire, and 3) target antagonism – characteristics which arouse the anger, jealousy, or destructive impulses of the offender (Finkelhor and Asdigian, 1996). In sum, individual characteristics can make targets differentially attractive to the potential offender, thus increasing the likelihood of victimization.

While the routine activities approach describes the necessary elements of a criminal incident, the rational choice perspective addresses the processes by which offenders make decisions. Offenders seek to maximize pleasure and profits while minimizing pain and costs; decision making is based on a rational calculus about situational outcomes. Situations, however, are not perceived the same by all. Rather, perception is a function of previous experience and the information processing abilities of the individual (Clarke and Cornish, 1985). Therefore, the information used to make decisions can be inaccurate, with judgment being clouded by situational changes, drugs, and/or alcohol, thus contributing to the "bounded" nature of offender rationality. A basic tenet of the rational choice perspective is that criminal decision-making is crime specific (Cornish and Clarke, 2008). That is, each criminal event has its own motives, purposes, and benefits for offenders; therefore, the factors which shape offender decision-making likely vary by offense.

Situational crime prevention, which is grounded in the rational choice perspective, suggests that environments and situations are important in understanding criminal events because they can create an opportunity for crime. More recently, Wortley (2001) argued that environments and situations not only provide opportunities for crime but can also supply the

motivation for crime by actively evoking behavioral responses. Situations can precipitate criminal responses by presenting cues that prompt offending, through exerting social pressure to offend, weakening moral prohibitions, and emotional arousal producing a criminal response (Wortley, 2001). Situational crime prevention techniques, therefore, are focused on manipulating and managing the environment so as to alter the opportunity structures and/or motivations for a particular crime by: 1) increasing the effort needed to commit the crime, 2) increasing the risks associated with the crime, 3) reducing the rewards provided by the crime, 4) reducing provocations which lead to crime, and 5) removing excuses for committing the crime (Cornish and Clarke, 2003).

Crime pattern theory suggests that the spatially-patterned nature of crime is a function of environmental characteristics, offender perceptions, and offender movements (Brantingham and Brantingham 1981, 1993, 1995). Motivated offenders engage in a target selection process, during which the environment emits cues perceived by the offender, who then perceives the area as being favorable or unfavorable for crime (Brantingham and Brantingham, 1981). Over time, offenders develop templates from these cues and use them to interpret future environments during the target selection process. Brantingham and Brantingham (1993) suggest that offenders frequently encounter their targets in shared activity spaces; that is, offenders and targets often intersect during the course of their routine activities, thus making the locations and the routes traveled to these locations important in determining the spatial patterns of crime. In addition, some places referred to as *crime generators* and *crime attractors*, have particularly high levels of crime due to the activities and people associated with them (Brantingham and Brantingham, 1995). Crime generators are those places which people use for reasons other than crime, but the routine activities associated with these locales create criminal opportunities. Conversely, *crime*

attractors are those places which draw offenders in because their characteristics are favorable for crime.

In sum, the environmental criminological perspective suggests that environmental and situational factors shape real and perceived opportunities for crime. To date, these perspectives have been used to understand crime and victimization patterns. We draw on these perspectives below to understand the distribution of victim injury across violent incidents.

TEXAS STATISTICAL ANALYSIS CENTER

Texas NIBRS (TIBRS) system was certified in July of 1998 and has 58 jurisdictions reporting. TIBRS covers approximately 13% of the state's population and about 15% of the state's crime. Some of the larger metropolitan areas (e.g., Dallas, Houston, Austin, and San Antonio) are not currently represented in NIBRS. To date, little analysis of the TIBRS data has been completed and the purpose of the present study is to address a relevant research question and to demonstrate the potential that TIBRS has for both reporting and non-reporting jurisdictions.

The Texas Department of Public Safety (DPS) is working to develop capacity to extract Texas Incident-Based Reporting System (TIBRS) data elements from local agency software and loading it onto the DPS TIBRS web software. Texas uses a customized version of NIBRS. This version returns the basic data required by the FBI, but includes additional data required by the state. The TIBRS includes an additional segment (Segment Level 8) with additional data elements such as number of drug labs or fields seized, precursor drug chemicals involved and family violence data. The TIBRS data are housed at and managed by the Texas Department of Public Safety.

THE PRESENT STUDY

As noted, little is known about the environmental and situational correlates of victim injury during crime incidents. The availability of data through incident-based reporting systems provides the opportunity to examine this policy-relevant topic. To this end, the present study seeks to answer the following research question: What are the environmental and situational predictors of victimization injury risk and severity during violent incidents?

The present study examines the environmental and situational predictors of victim injury risk and severity using incident-based data from five Texas cities (Amarillo, Denton, El Paso, Fort Worth, and Plano). We ground our analyses in an environmental criminological perspective which guides operationalization of environmental and situational influences and suggests that the likelihood and extent of victim injury during a violent incident are shaped by immediate environmental and situational predictors. Few studies have examined the correlates of victim injury using incident-level data, and those that analyzed incident-data have not fully capitalized on the incident-level nature of the data. Rather, prior research has limited examination to the first victim and first offender appearing in the dataset, potentially ignoring relevant incident-level information, such as incidents perpetrated against mixed-gender or mixed-race victim groups (Messner et al., 2004; D'Alessio and Stolzenberg, 2009).

We estimate crime specific models to examine whether the effects vary by crime type, with robberies, sexual offenses, and assaults analyzed separately to determine the correlates of victim injury risk and severity. The general objectives of these crime types differ. Robbers are generally motivated by material gain, with violence being used instrumentally to gain compliance. Sexual offenders seek sex and power; violence may be used instrumentally to gain compliance, though it is difficult to untangle from the pursuit of power and dominance that often

accompanies sexual offenses. Assault is more often a crime of passion or anger in which injury might actually be the goal of the offender. Because offenders' objectives across these crime types likely vary, it is important to examine separately the correlates of victim injury.

Data

The data for the present study of victim injury during non-fatal violent incidents come from the 2006 National Incident Based Reporting System (NIBRS). NIBRS data are collected by local law enforcement agencies and collated yearly by the federal government[2]. These data are not nationally representative of all crime incidents, as a considerable percent of states and law enforcement agencies do not contribute to NIBRS; in particular, large cities are less likely than small ones to submit full and complete data regarding criminal incidents in their jurisdiction (Maxfield, 1999; Roberts, 2007). In 2004, over 5,200 agencies (representing 26 states (www.fbi.gov) and roughly 20% of the US population) reported to NIBRS. The 2006 NIBRS data reflect contributions from all 50 states and the District of Columbia; however, these data cannot be considered a nationally representative sample of all criminal incidents due to non-reporting from several jurisdictions.

Consistent with its name, NIBRS data are incident-based recordings of criminal activity that include information on offenses, victims, offenders, property, persons arrested, and contextual factors related to the incident (Akiyama & Nolan, 1997). One key advantage of these data is the ability to link all pertinent information and analyze variables from each of these sources within one crime incident. Maxfield (1999) outlined several additional advantages, including the ability to study events at lower levels of aggregation compared to data collected in the Uniform Crime Reports (UCR) (i.e., the incident rather than the jurisdiction) and the potential to investigate the complexity of a single incident by maintaining all pertinent

[2] The 2006 NIBRS data were the most recent data publicly available for analysis.

information regarding multiple offenses, offenders, or victims within an incident. In addition, NIBRS offers a snapshot of criminal events that encompass relevant factors as identified within the theoretical framework of environmental criminology.

NIBRS data also possess several limitations that need to be considered when interpreting results from analyses (Maxfield, 1999). As with other official sources of data, NIBRS data only represent criminal incidents reported to the police and do not allow for a measure of the dark figure of crime. The nature of the data structure is highly complex and difficult to manipulate for analysis. For example, several different units of analysis exist within the NIBRS data (i.e., incidents, offenders, victims, etc.). Thus, decisions must be made regarding how to best collate the data into a useable form while recognizing that any such modifications introduce the potential for error and incorrect conclusions. Finally, the failure to fully represent all sectors of the nation limit the generalizability of the data and provide results that must be tempered with caution to avoid overstating the conclusions.

The present study examines data from the five largest Texas cities reporting to NIBRS during this period, with each city having a population exceeding 100,000. The 2006 NIBRS data were obtained from the Interuniversity Consortium for Political and Social Research (ICPSR) web-site which provides free access to the public. The data were received in a series of SPSS files that required merging based on the chosen unit of analysis. To address the research questions posed here, the incident was selected as the appropriate unit of analysis and all datasets were merged to that unit of aggregation. This process required several steps to ensure data integrity and accuracy.

The 2006 NIBRS data contains information on the incident, victim, offender and offense and these disparate SPSS files were merged based on a unique identifier. Additional datasets not

used included information regarding the organizations reporting the data, arrests of offenders, and property lost during the incident. The process of merging all files was conducted within SPSS using syntax to create a record of all data manipulations and to ensure data integrity. The key component of this process required the transposition of cases to variables for all information within the victim, offender, and offense databases. It is possible for multiple victims, offenders, or offenses to occur within one incident. To ensure no inflation of the number of incidents, all incidents containing multiple victims, offenders, or offenses were transposed into variables and merged into the incident database. This process was extremely time consuming and created numerous additional variables. The benefit of this approach was to ensure no loss of information regarding incidents involving multiple victims, offenders, or offenses. This is a primary advantage of the NIBRS data and improves upon previous research that often has simply analyzed incidents by considering the first victim, offender, or offense within an incident. This stepwise process resulted in 21,387 incidents of robberies, sexual offenses, and assaults for analysis. All incidents involving other crime types were removed.

Dependent Variables

Victim injury risk and severity were the two dependent variables of interest for this study. *Victim injury risk* is a dichotomous variable that measures whether or not any victim was injured during the crime incident. Nearly 64% of incidents contained an injured victim. *Victim injury severity* is an ordinal variable that reflects the most severe injury sustained by any victim during the incident. Here, we follow Messner et al.'s (2004) operationalization of victim injury severity: no injury, minor injury, and major injury (e.g., broken bones, severe lacerations, loss of teeth, unconsciousness, or potential internal injury). Over 58% of incidents had a minor injury as the most severe victim injury, and 5.5% of incidents had a major victim injury.

Independent Variables

Victim Characteristics

Measures of several environmental and situational factors were included, which we hypothesize will influence the likelihood and severity of victim injury during violent crime incidents. *Number of victims* is a count of the number of victims within a crime incident. Consistent with the routine activities approach, we predict that incidents with more crime victims will be less likely to result in injury, as multiple victims provide guardianship for one another, making it difficult for the offender(s) to inflict injury.

Victim age represents the age of the victim in years, or in the case of incidents with multiple victims, the mean age in years of victims within the criminal incident. In terms of target suitability, age can represent one aspect of victim vulnerability (Finkelhor and Asdigian, 1996), as older victims may be less capable of protecting themselves from injury during the criminal incident.

Victim gender is measured using a series of dummy variables to tap the combination of victims' gender within a criminal incident. *All female victim group* and *mixed gender victim group* are two dummy variables, with *all male victim group* being the omitted reference category in the analyses. It is unclear as to the role that victim gender might play in sustaining injuries during violent incidents. It may be the case that female victims, due to size and real or perceived weakness, are particularly vulnerable and thus easily injured. On the other hand, offenders may be less likely to injure their female victims if they are easier to control without injury. With male victims, injury might be necessary to gain compliance. In addition, if males are more likely to resist victimization, the situation might escalate, thus increasing the likelihood and severity of injury.

Victim race and ethnicity is measured using a series of dummy variables to tap the combination of victims' race and ethnicity within a criminal incident. Dummy variables include: *Black, non-Hispanic*; *Hispanic*; and *mixed race/ethnicity*, with *White, non-Hispanic* being the omitted reference category in the analyses.[3] Note that the *mixed race/ethnicity* category refers to individuals of different races being victims within the same crime incident.

Victim resident is a dichotomous variable which measures whether any victims in the criminal incident live in the locality in which the crime occurred.

Offender Characteristics

Number of offenders is a count of the number of offenders within a crime incident. We expect that incidents with more offenders will be more likely to result in injury for several reasons. First, as the number of offenders within the incident increases, it reflects a greater number of motivated offenders. Second, consistent with Wortley's (2001) idea of situational provocation, presence of co-offenders may actually permit the injuring behavior by weakening moral prohibitions in a group setting.

Offender age represents the estimated age of the offender in years according to the victim(s), or in the case of incidents with multiple offenders, the mean age in years of offenders within the criminal incident. In terms of the predicted effect of offender age on victim injury, we suggest that older, more seasoned offenders will be more likely to gain compliance from their victims without inflicting injury, while younger, less experienced offenders will be more emotional and prone to inflicting injury.

Offender gender is measured using a series of dummy variables to reflect the combination of offenders' gender within a criminal incident as reported by the victim(s). *All*

[3] *Other race victim group* (i.e., Asian or American Indian) was initially included, but these incidents make up less than 1% of all incidents, so these cases were removed from the analyses in the interest of model stability.

female offender group and *mixed gender offender group* are two dummy variables, with *all male offender group* being the omitted reference category in the analyses. Similar to victim gender, it is unclear how offender gender might influence victim injury during criminal incidents. It may be the case that male offenders, due to physical size and strength, are more likely to injure their victims. On the other hand, females may be more prone to the instrumental use of violence, including injury, in order to achieve compliance on the part of their victims, while males' physical size alone may allow them to gain control of the situation without inflicting injury.

Offender race is measured using a series of dummy variables which capture the combination of offenders' race within a criminal incident as reported by the victim(s). Dummy variables for the race of the offender group include *Black* and *mixed race*, with *White* being the omitted reference category in the analyses[4] (NIBRS data do not include information on offender ethnicity). Similar to the victim race variables, *mixed race* offender groups are those which include two or more offenders of different races.

Offender known to victim reflects whether any victims report knowing any of the offenders from the criminal incident.[5] We hypothesize that incidents in which victims know their offenders will be more likely to result in victim injury. If there is a prior relationship between the victim(s) and offender(s), the victimization is more likely to be part of an ongoing interpersonal conflict or serial victimization, potentially adding to the perceived target suitability of the victim. Not only will such victims appear particularly vulnerable to offenders, but they

[4] *Other race offender group* (i.e., Asian or American Indian) was initially included, but these incidents make up less than 1% of all incidents, so these cases were removed from the analyses in the interest of model stability.

[5] NIBRS data includes a category for "unknown" relationship between the victim and offender and "missing." As Messner et al. (2004) argue, the missing category could refer to an incident in which the police fail to provide any entry for this variable. We follow Messner et al.'s (2004) approach in recoding these missing cases as unknown relationships to avoid losing cases because of missing values. A similar procedure is used with the *offender under the influence* variable, with a value of 1 reflecting that the victim, offender or the police reported drug or alcohol use by the offender. A value of 0 reflects a negative response or no response.

also may be more likely to be perceived as antagonistic, provoking offenders and eliciting anger, thus increasing the likelihood of injury.

Offender under the influence reflects whether any victim, offender, or police officer reports any offender being under the influence during the criminal incident. Drawing from the rational choice perspective (Clarke and Cornish, 1985), we hypothesize that incidents which include an offender who is under the influence will be more likely to result in victim injury, as the offender's judgment is clouded by drugs and/or alcohol. Further, the concept of situational precipitators (Wortley, 2001) suggests that situations with alcohol and drugs are more likely to result in victim injury, as offenders lose their moral inhibitions.

Event Characteristics

Location of the incident is also included in the analyses. The environmental criminological perspective suggests that some locations will be more favorable for crime. As crime pattern theory asserts (Brantingham and Brantingham, 1981), offenders take note of the cues emitted by the environment and interpret places as favorable or unfavorable for offending. We extend this notion to include victim injury, arguing that violent incidents that occur at location types that typically have clear place managers will be less likely to result in injury. NIBRS data include several different categories for location type, which we collapsed into the dummy variables of *public* and *semi-public*, with *private* locations being the omitted reference category in the analyses.[6] We predict that violent victimizations which occur in semi-public locations are less likely to result in victim injury, given that such locations typically have clear place management which would preclude the offender's ability to inflict injury.

[6] Public locations include places which are open to the public and generally not assigned specific management, such as fields/woods, highways/roads/alleys, lakes/waterways, and parking lots/garages. Private locations are defined as residences and homes. Semi-public locations are those places which are open to the public, but are generally managed by some specific entity, such as banks, bars, convenience stores, restaurants, etc.

Daytime is measured using a dummy variable which measures whether the incident occurred between the hours of 7:00 am and 7:00 pm, a timeframe during which societal routine activity patterns are structured around legitimate activities such as work and school. Such activities typically include guardians, handlers, and place managers who are likely to intervene in criminal incidents and disrupt violent victimization before injury occurs. All else being equal, routine activities occurring during other times (i.e., between 7 pm and 7 am) are less likely to have guardians, handlers, or place managers present to disrupt violent situations before injury occurs.

Any weapon measures whether there was any weapon present during the incident. Subsequent analyses also examine whether the type of weapon present influences the likelihood of victim injury. Therefore, we created a series of dummy variables to reflect the most lethal weapon present during the incident. Specifically, we include the variables *firearm, knife,* and *other* (e.g., blunt object), with *no weapon* being the omitted reference category in the analyses. Drawing from the rational choice perspective, we hypothesize that simply brandishing a lethal weapon during the incident may elicit victim compliance; therefore offenders may be less likely to injure victims during these incidents. Consistent with the concept of situational provocation, victims are less willing to be coerced by other types of weapons, thus provoking injury by the offender to attain victim compliance.

We also include a series of dummy variables to control for the city in which the incident occurred – *Amarillo*, *Denton*, *El Paso*, and *Plano* – with *Fort Worth*, the city reporting the greatest number of criminal incidents in 2006, being the omitted reference category in the

analyses. Descriptive statistics for all study variables are available in Table 1[7] (See APPENDIX for all tables).

Crime Type

Guided by the environmental criminological perspective, we estimate crime specific models of victim injury. As the rational choice perspective suggests (Cornish and Clarke, 2008), the motives, purposes, and benefits of crime for the offender likely varies across offense types. For example, the use of injury during robbery is likely instrumental to accomplish the goal of material gain, whereas injury itself might be the goal of an assault (Table 2 displays victim injury severity by crime type). Of the 1,289 robberies analyzed, nearly 40% resulted in minor victim injury and just over 9% resulted in major victim injury. Of the 1,100 sexual offenses analyzed, 18% resulted in minor injury and 5% resulted in major injury. Finally, over 62% of the 18,998 assaults resulted in minor injury, with over 5% resulting in major victim injury.

Analytic Techniques

Previous victimization research has largely focused on the likelihood of victimization. The present study seeks to examine victimization experiences in further detail by exploring the correlates of victim injury during the crime incident. Logistic regression analysis was used to identify the environmental and situational correlates of victim injury risk. Logistic regression is used to predict the likelihood of a dichotomous outcome using one or more variables, as using ordinary least squares regression to analyze a dichotomous outcome violates the assumption of linearity. To correct for this, logistic regression analysis manipulates the outcome so that a linear relationship can be estimated. Specifically, logistic regression analysis predicts the natural log of the odds ratio (Pampel, 2000).

[7] We initially included *hate bias* as a variable in our models of victim injury risk and severity. However, there was substantial missing data on this variable and it was not significant, so it was removed from the analyses.

Beyond examining the risks for victim injury, the present study also explores the predictors of victim injury severity. The use of ordinary least squares regression to predict ordered, categorical outcomes violates assumptions of the linear model. Because the dependent variable is ordered, we initially proposed ordinal regression analyses (McCullagh, 1980; O'Connell, 2006) to specify the factors influencing the severity of victim sustained injuries. Ordinal regression assumes that the relationships between the independent variables and the logits are the same for all the logits, meaning that the results are a set of parallel lines, one for each category of the dependent variable (Clogg and Shihadeh, 1994). To test this assumption, we conducted a test of parallel lines. The null hypothesis is that the slopes are the same across each category of the dependent variable. If the null is rejected (i.e., if the slopes actually vary significantly), then ordinal regression is not appropriate, in that the assumption of equal slopes is violated. These data did not meet the assumption of parallel regression lines (Chi square = 2495.44, df = 30, $p<0.001$), therefore we analyzed the data using multinomial regression analyses to explore the correlates of victim injury severity.

Multinomial logistic regression allows for categorical dependent variables and does not make assumptions about normality, linearity, or homogeneity of the predictor variables. We initially proposed ordinal regression analyses because the models are more parsimonious, producing a single set of coefficients, while multinomial logistic regression analysis produces one set of coefficients for each category of the dependent variable, minus one for the omitted reference category (Pampel, 2000). Despite this difference, the multinomial logistic regression analysis allows for the examination of the research question and is the more appropriate technique for these specific data. Each set of coefficients can be interpreted as the effect of one

unit change in the independent variable on the logged odds of falling into each category as the dependent variable, relative to the omitted category of the dependent variable (Pampel, 2000).

RESULTS

Victim Injury Risk

Table 3 displays the results from the logistic regression analyses for victim injury risk. Model A describes effects of any weapon, while Model B describes the effects of specific weapon types at criminal incidents on the risk of victim injury. The presence of any weapon had a significant negative effect on the likelihood of victim sustained injury during the criminal incident. However, when various weapon types were examined in Model B, the effects of weapons were more nuanced, highlighting the importance of considering the potential countervailing effects of different weapons. Specifically, the presence of firearms and knives at a criminal incident (relative to incidents with no weapon) significantly reduced the risk of victim injury, while the presence of other weapons significantly increased the risk of victim injury.

Beyond the effects of specific weapon types, Model B in Table 3 displays the effects of various situational and environmental factors on victim injury risk for all crime types (i.e., robberies, sexual offenses, and assaults). Incidents with older victims were significantly more likely to result in victim injury. In addition, criminal incidents with only Hispanic victims (relative to incidents with only White victims) were significantly more likely to lead to victim injury, while those incidents with only female victims and incidents with both male and female victims (relative to incidents with only male victims) were less likely to result in victim injury. In terms of the influences of offender characteristics on victim injury risk, the number of offenders at the incident significantly increased the likelihood of victim injury. Further,

incidents with only female offenders (relative to incidents with only male offenders), incidents with only Black offenders (relative to incidents with only White offenders), incidents with offenders known to the victims, and incidents with offenders who were reportedly under the influence were more likely to result in victim injury. Event characteristics also affected victim injury risk during criminal incidents. Relative to incidents that occurred in semi-public locations, incidents that occurred in private and public locations were significantly more likely to result in victim injury. In addition, incidents which occurred during daytime hours were associated with lower risk of victim injury. Finally, criminal incidents which occurred in Amarillo, Denton, El Paso, and Plano were significantly more likely to result in victim injury compared to those incidents which occurred in Fort Worth.

Guided by the environmental criminological perspective which suggests that the motivations and opportunity structures for various crime types may differ, we also separately examined the correlates of victim injury risk for robberies, sexual offenses, and assaults. Table 4 reports the logistic regression analyses for victim injury risk by crime type. Robbery incidents with only female victims were less likely to result in injury relative to incidents with only male victims. Incidents with more offenders and an offender under the influence were more likely to result in victim injury, while incidents perpetrated by two or more offenders of different races were less likely to result in victim injury. Similar to the general model of victim injury risk, robberies which occurred in private and public locations were significantly more likely to result in victim injury relative to those that occurred in semi-public locations. Robbery incidents which included a firearm, knife or other weapon were less likely to result in injury relative to robberies which had no weapon.

Sexual offense incidents with older victims and offenders under the influence had a significantly greater risk of resulting in victim injury. Unlike robberies, sexual offenses which included knives or other weapons were more likely to result in victim injury relative to those incidents with no weapons. Finally, sexual offense incidents which occurred in Amarillo and El Paso were significantly more likely to result in victim injury relative to those that occurred in Fort Worth.

Assault incidents perpetrated against older victims were more likely to lead to victim injury, while those incidents which included female victims only, male and female victims, and those with Black victims only were less likely to have injured victims. Similar to robbery incidents, assaults perpetrated by more than one offender were significantly more likely to result in injury to victims. Further, those incidents with Black offenders, offenders known to the victims, and offenders who were reportedly under the influence had an increased risk of victim injury. Similar to robbery, assault incidents which occurred at private and public locations were significantly more likely to result in victim injury relative to those incidents which occurred at semi-public locations. Assaults occurring during daytime hours were less likely to result in victim injury. The presence of a firearm or knife at an assault was significantly and negatively related to victim injury risk, while other weapons significantly increased the likelihood of victim injury during the incident. Finally, assault incidents which occurred in Amarillo, Denton, El Paso, and Plano were significantly more likely to result in victim injury compared to those incidents which occurred in Fort Worth.

Victim Injury Severity

In addition to examining the correlates of victim injury risk across crime types, we also explored how the influence of these factors might vary when the severity of the victim injury is

considered. Tables 5 through 7 display the multinomial logistic regression models for victim injury severity across robberies, sexual offenses, and assaults. As discussed above, multinomial logistic regression analysis produces one set of regression coefficients for each category of the dependent variable relative to the omitted category. For the present study, our analysis produced two sets of coefficients for each crime type: the first describes the effects of the independent variables on minor injury and the second describes the effects of the independent variables on major injury.

Table 5 displays the multionomial logistic regression results for victim injury severity during robberies. Robbery incidents with female victims only were less likely to result in minor injury relative to those which had male victims only. Those incidents with more offenders, as well as those with offenders under the influence, were more likely to result in minor victim injury. Robbery incidents with offender groups that had at least one male and one female, as well as those with offenders of different racial groups, were less likely to result in minor victim injuries. Incidents which occurred in public were more likely to result in minor injury, while those which included firearms, knives, or other weapons were all less likely to result in minor victim injuries. Robberies that occurred in Amarillo were less likely to result in minor victim injuries relative to those that occurred in Fort Worth. Similar to the findings for minor injury, robbery incidents with female victims only (compared to incidents with male victims only) were less likely to result in major victim injury. Further, the number of offenders also significantly increased the likelihood of major victim injury during robbery incidents. Robbery incidents which occurred in private and public locations (relative to semi-public) were also significantly more likely to result in major victim injuries. Finally, the presence of a firearm or knife significantly decreased the risk of major victim injury during robbery incidents.

Table 6 displays the multinomial logistic regression results for victim injury severity during sexual offenses.[8] Sexual offenses with older victims were significantly more likely to result in minor injury (relative to no injury). When the incident included an offender who was under the influence of drugs or alcohol, the likelihood of minor victim injury increased. Incidents which included a knife or other weapon were also more likely to result in minor victim injury. Finally, sexual offenses which occurred in Amarillo and El Paso were more likely to result in minor victim injuries relative to those which occurred in Fort Worth. Similar to the results for minor injuries, sexual offenses with older victims were more significantly more likely to result in major victim injuries (relative to no injuries). In addition, incidents which occurred in public locations and included in a knife were also significantly more likely to result in major victim injuries.

Table 7 displays the multinomial logistic regression results for victim injury severity during assaults. Assaults perpetrated against older victims were more likely to result in minor injuries, while those with female victims only, male and female victims, Black victims only, and mixed race victim groups were less likely to result in minor victim injuries. Assaults with more offenders, older offenders, female offenders, and Black offenders were significantly more likely to result in minor victim injures. Further, those with offenders known to the victims and offenders who were reportedly under the influence of drugs or alcohol had a higher likelihood of resulting in minor victim injuries. Relative to those assaults which occurred in semi-public locations, incidents which occurred in private or public locations were significantly more likely to result in minor victim injury. Assaults occurring during daytime hours were less likely to

[8] The initial multinomial logistic regression model for victim injury severity during sexual offenses revealed that the standard error for major injuries in Denton was incredibly high (*SE* = 8697.92), raising the concern that the coefficient estimates may be unstable. Further investigation revealed that of the 91 sexual offenses occurring in Denton, 18 resulted in minor injuries and none resulted in major injuries. In the interest of model stability, Denton cases were removed from the final model of victim injury severity in sexual offenses presented in Table 6.

result in minor victim injuries, as were those which included firearms and knives. Finally, assaults which occurred in Amarillo, Denton, El Paso, and Plano were significantly more likely to result in minor victim injuries relative to those which occurred in Fort Worth.

Assaults with female victims only and mixed gender victim groups were less likely to result in major victim injuries, while those with Hispanic victims only were more likely to result in major injuries. Assaults with more offenders were more likely to result in major victim injuries, as were assaults in which the offender was under the influence. Assaults with female offenders were less likely to have major victim injuries. Assaults which occurred during the daytime were less likely to result in major victim injuries. When there was a firearm, knife, or other weapon present during an assault, the likelihood of major victim injuries (relative to no injuries) significantly increased.

DISCUSSION

The present study examined the situational and environmental correlates of victim injury and severity. Our crime specific models of victim injury risk and severity demonstrated the importance of examining the correlates of each crime type separately; that is, findings varied across the robbery, sexual offenses, and assault models. Note that nearly 89% of the general model (Table 3, Model B) was comprised of assaults. It is likely that these assaults were largely driving the significant findings in the general crime model, thus necessitating separate analyses for the less common crime types of robbery and sexual offenses. Beyond the results described in the previous section, there are a few findings which warrant further discussion.

First, the model statistics for the crime type specific logistic regression models varied considerably (see Table 4). The pseudo-R^2 was much higher for the robbery and sexual offenses models (0.31 and 0.19 respectively) relative to that of the assault model (0.08). One possible

interpretation of this finding is that robbery, and to a lesser degree sexual offenses, are typically more "rational" than assaults, and thus more heavily influenced by situational and environmental factors. Though there were more significant findings for the assault model, the sample size was several times larger than the robbery and assault sample sizes, thus making significance easier to achieve in the assault analyses.

Second, females were significantly less likely to be injured relative to males during robberies and assaults. With respect to assault, incidents with mixed gender victim groups were also significantly less likely to result in victim injury. These results were also found in the assault multinomial logistic models. Given that this finding holds for incidents with female victims only *and* incidents with mixed gender groups suggests that the presence of a female might serve to reduce the likelihood of injury during assault incidents. This incident-level finding may have been masked had the analysis been conducted at the victim-level.

Third, location type emerges as an important factor in developing an understanding of victim injury across all crime types. Our operationalization of location type was grounded in concepts from the routine activities approach and crime pattern theory, which suggest that the presence of place managers can prevent the commission of crime at places (Eck, 1994; Felson, 1995) and that offenders perceive cues from their environment about the favorability of certain locations for criminal behavior (Brantingham and Brantingham, 1981). Consistent with our hypothesis, incidents that occurred in private or public locations were more likely to result in injury relative to those which occurred in semi-public locations. One plausible interpretation of this finding is that semi-public locations, relative to private and public locations, are more likely to be managed by individuals specifically tasked with supervising the place and the behaviors there. When violent incidents occur in these places, place managers are likely quick to intervene

before the offenders can inflict injury on their victims. When violent incidents occur behind closed doors in private locations, the likelihood of anyone being present to quickly intervene and prevent victim injury is more variable and likely lower. When offenders perpetrate their violent crimes in public, they must only avoid interference by random bystanders; many public locations lack regular, systematic place management necessary to quickly intervene in a violent incident to prevent victim injury.

Similar to the importance of location, our findings suggest that time of day significantly influences victim injury during violent incidents. Consistent with our hypothesis, assaults occurring during the day are less likely than those that occur at night to result in victim injury. One interpretation of this finding is that societal routine activity patterns which occur during the day are more likely to introduce guardians, handlers, and place managers who can intervene and prevent injury to the victim. In addition, offenders may be more sensitive to the potential intervention by these people and thus be deterred from inflicting injury during these times. Drawing from crime pattern theory (Brantingham and Brantingham, 1981), offenders may perceive such times as being less favorable for crime because of environmental cues which suggest that intervention by others is likely, in terms of calling the police, intervening, or acting as witnesses at trial.

Our findings related to the influences of time and location suggest that the importance of controllers – guardians, handlers, and place managers – from routine activities theory may go beyond simply deterring offenders from committing crimes. Studies grounded in routine activities theory typically examine crime or victimization as the dependent variable. These studies hypothesize that potential offenders note the presence of controllers and refrain from offending. There are at least two other ways, however, that controllers might provide public

safety benefits which would not be captured by studies that examine crime or victimization as the dependent variable. First, potential offenders might actually commit their crimes, but limit the severity of their offending (i.e., inflicting injury on their victims) because of their perception that nearby controllers will intervene. Second, potential offenders may carry out their crimes in spite of nearby controllers, but such controllers actually intervene during the crime event to limit the extent of victimization and prevent victim injury. Both of these scenarios would still be recorded as crimes or victimizations, thus masking the important public safety benefit offered by controllers (i.e., deterring offenders from inflicting injury or actually intervening before they can inflict injury). Though the present study is not able to directly assess the effects of controllers on victim injury, the significant findings of location and time of day (two variables often considered in routine activities research) do suggest that routine activities might continue to influence the crime event as it unfolds. One area for future research is to examine the potential additional public safety benefits that might be offered by controllers beyond simply the prevention of a crime incident.

As discussed above, there are many advantages to using NIBRS data to examine the correlates of victim injury. NIBRS collects information on victims, offenders, and offenses, and these separate datasets can be manipulated and merged to build an incident-level database that is rich with information. For example, as the present study demonstrated, the incident-level nature of the data allows researchers to consider not just a single victim's or offender's characteristics, but the combination of individuals who might be present during a criminal incident. Given that the present study was grounded in an environmental criminological perspective, NIBRS data were particularly useful in providing information about various environmental and situational factors which might shape the opportunity structure for victim injury during violent incidents.

Despite the noted benefits of using NIBRS data, there are limitations to the present study and the use of NIBRS data in general for studying victim injury. Specifically, NIBRS does not contain a measure of victim behavior (e.g., resistance, compliance, etc.) during the criminal incident. This raises the question of whether some of the significant relationships between the measured independent variables and victim injury might be mediated by victim behavior. For example, the present study consistently found that criminal incidents which contain female victims are less likely to result in victim injury, relative to those with male only victims. We hypothesize that this relationship might be explained by the greater tendency of male victims to resist victimization, thus precipitating injury. Without a measure of victim behavior during the criminal incident, this potential mediating effect between victim gender and victim injury cannot be empirically explored.

An additional limitation of the present study is the potential generalizability of the findings to criminal incidents occurring in cities other than the five Texas cities included in the analyses. The dummy controls for city were significant in many of the models, indicating that the city in which a criminal incident occurs significantly influences victim injury risk and severity. In many ways, these findings raise more questions than provide answers, in that they suggest that there may be contextual-level effects which influence victim injury. Given the significant city effects found in the present study, it is clear that the city in which crime incidents unfold matters, but beyond that, it is unclear what it is about particular cities which make them more or less suitable for victim injury during crime incidents. One potential avenue for future research would be to model city-level effects to explore the potential influences of city characteristics on victim injury risk and severity. In addition to modeling the city-level effects,

cross-level interactions could also be modeled to explore whether the influence of incident-level correlates varies across cities.

In sum, the present study examined the correlates of victim injury and severity during non-lethal violent incidents. Grounded in an environmental criminological perspective, the analyses suggest that, similar to the occurrence of victimization, the nature and extent of victimization (i.e., injury and severity of injury) is shaped by environmental and situational factors. Further, the influence of such factors varies across crime type, lending support to the argument that such crimes should examined separately because they have different motives and opportunity structures.

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APPENDIX

Table 1. Descriptive Statistics of Study Variables (N=21,387 Crime Incidents)

Dependent Variables	Valid			
Victim injury				
No	36.09%			
Yes	63.91%			
Victim injury severity				
None	36.09%			
Minor	58.41%			
Major	5.50%			
Independent Variables	**Min.**	**Max.**	**Mean**	**SD**
Victim Characteristics				
Number of victims	1.00	9.00	1.18	0.50
Victim age (average)	0.00	97.00	29.23	13.14
Victim gender				
All male	0.00	1.00	0.34	0.47
All female	0.00	1.00	0.60	0.49
Mixed gender	0.00	1.00	0.06	0.24
Victim race/ethnicity				
White, Non-Hispanic	0.00	1.00	0.33	0.47
Black, Non-Hispanic	0.00	1.00	0.22	0.42
Hispanic	0.00	1.00	0.42	0.49
Mixed race/ethnicity	0.00	1.00	0.03	0.16
Victim resident	0.00	1.00	0.94	0.25
Offender Characteristics				
Number of offenders	1.00	10.00	1.23	0.64
Offender age (average)	10.00	99.00	28.93	11.93
Offender gender				
All male	0.00	1.00	0.74	0.44
All female	0.00	1.00	0.20	0.40
Mixed gender	0.00	1.00	0.05	0.23
Offender race				
White	0.00	1.00	0.68	0.46
Black	0.00	1.00	0.30	0.46
Mixed race	0.00	1.00	0.02	0.13
Offender known to victim	0.00	1.00	0.82	0.39
Offender under influence	0.00	1.00	0.13	0.34

Independent Variables cont.	Min.	Max.	Mean	SD
Event Characteristics				
Location				
Private	0.00	1.00	0.63	0.48
Semi-public	0.00	1.00	0.18	0.38
Public	0.00	1.00	0.20	0.40
Daytime (7am to 7pm)	0.00	1.00	0.43	0.50
Any weapon	0.00	1.00	0.23	0.42
Weapon type[9]				
Firearm	0.00	1.00	0.05	0.22
Knife	0.00	1.00	0.06	0.23
Other weapon	0.00	1.00	0.12	0.32
No weapon	0.00	1.00	0.77	0.42
City				
Amarillo	0.00	1.00	0.12	0.33
Denton	0.00	1.00	0.05	0.22
El Paso	0.00	1.00	0.31	0.46
Fort Worth	0.00	1.00	0.45	0.50
Plano	0.00	1.00	0.06	0.24
Crime type				
Robbery	0.00	1.00	0.06	0.24
Sexual offenses	0.00	1.00	0.05	0.22
Assault	0.00	1.00	0.89	0.32

[9] The following weapons categories are mutually exclusive variables used to examine the effect of various weapon types on victim injury during a criminal incident. They were not used in the same regression analyses as the "any weapon" dummy variable.

Table 2. Victim Injury Severity by Crime Type (N=21,387)

	Robbery	Sexual offenses	Assault	Total
No Injury	671 (52.1%)	847 (77.0%)	6,200 (32.6%)	7,718 (36.1%)
Minor Injury	501 (38.9%)	198 (18.0%)	11,794 (62.1%)	12,493 (58.4%)
Major Injury	117 (9.1%)	55 (5.0%)	1,004 (5.3%)	1,176 (5.5%)
Total	1,289 (100.0%)	1,100 (100.0%)	18,998 (100.0%)	21,387 (100.0%)

Table 3. Logistic Regression for Victim Injury Risk, Any Weapon vs. Weapon Type (N=21,387)

	Model A			Model B		
	b	*SE*	Exp(B)	*b*	*SE*	Exp(B)
Victim Characteristics						
Number of victims	-0.11*	0.04	0.90	-0.03	0.04	0.97
Victim age (average)	0.01*	0.00	1.01	0.01*	0.00	1.01
Victim(s) female	-0.21*	0.03	0.81	-0.22*	0.03	0.80
Mixed gender	-0.19	0.08	0.83	-0.26*	0.09	0.77
Black, Non-Hispanic	-0.07	0.05	0.94	-0.07	0.05	0.93
Hispanic	0.09	0.04	1.09	0.11*	0.04	1.12
Mixed race/ethnicity	-0.06	0.10	0.94	-0.07	0.11	0.93
Victim resident	0.07	0.06	1.07	0.05	0.06	1.05
Offender Characteristics						
Number of offenders	0.23*	0.03	1.26	0.29*	0.03	1.34
Offender age (average)	0.00*	0.00	1.00	-0.01*	0.00	0.99
Offender(s) female	0.23*	0.04	1.25	0.16*	0.04	1.18
Mixed gender offender group	-0.11	0.08	0.89	-0.18	0.08	0.84
Black	0.07	0.05	1.07	0.14*	0.05	1.15
Mixed	-0.27	0.12	0.76	-0.29	0.12	0.75
Offender known to victim	0.34*	0.04	1.40	0.25*	0.04	1.28
Offender under influence	0.52*	0.05	1.68	0.50*	0.05	1.64
Event Characteristics						
Private	0.23*	0.04	1.26	0.27*	0.04	1.31
Public	0.22*	0.05	1.24	0.25*	0.05	1.29
Daytime (7am to 7pm)	-0.11*	0.03	0.90	-0.14*	0.03	0.87
Any weapon	-0.33*	0.04	0.72	-	-	-
Firearm	-	-	-	-1.60*	0.08	0.20
Knife	-	-	-	-0.35*	0.06	0.70
Other weapon	-	-	-	0.14*	0.05	1.15
Amarillo	0.32*	0.05	1.38	0.32*	0.05	1.38
Denton	0.19*	0.07	1.22	0.18*	0.07	1.20
El Paso	0.64*	0.04	1.90	0.60*	0.04	1.82
Plano	0.21*	0.06	1.24	0.18*	0.06	1.20
-2 log likelihood	7035.43			6569.72		
Nagelkerke R^2	0.06			0.09		
Model x^2	935.31*			1401.02*		

p<0.01

Table 4. Logistic Regression for Victim Injury Risk by Crime Type

	Robbery (N=1,289)			Sexual Offenses (N=1,100)			Assaults (N=18,998)		
	b	*SE*	Exp(B)	*b*	*SE*	Exp(B)	*b*	*SE*	Exp(B)
Victim Characteristics									
Number of victims	0.05	0.11	1.05	-0.16	0.27	0.85	-0.03	0.05	0.98
Victim age (average)	0.00	0.00	1.00	0.06*	0.01	1.06	0.00*	0.00	1.00
Victim(s) female	-0.52*	0.15	0.59	0.20	0.27	1.22	-0.16*	0.04	0.85
Mixed gender victim group	-0.02	0.30	0.98	0.65	0.72	1.92	-0.33*	0.09	0.72
Black, Non-Hispanic	0.24	0.21	1.27	-0.30	0.31	0.74	-0.16*	0.06	0.85
Hispanic	0.28	0.16	1.32	-0.01	0.20	0.99	0.07	0.04	1.08
Mixed race/ethnicity	0.47	0.37	1.60	-0.41	0.88	0.66	-0.21	0.12	0.81
Victim resident	0.00	0.21	1.00	0.18	0.30	1.20	-0.03	0.07	0.97
Offender Characteristics									
Number of offenders	0.42*	0.08	1.51	0.18	0.15	1.19	0.31*	0.04	1.36
Offender age (average)	0.01	0.01	1.01	-0.01	0.01	0.99	0.00	0.00	1.00
Offender(s) female	0.03	0.25	1.03	-0.76	0.62	0.47	0.06	0.04	1.07
Mixed gender offender group	-0.45	0.21	0.64	0.03	0.76	1.03	-0.19*	0.09	0.82
Black	0.12	0.16	1.13	0.45	0.25	1.56	0.12*	0.05	1.13
Mixed race	-0.70*	0.32	0.50	0.43	0.95	1.54	-0.20	0.14	0.82
Offender known to victim	0.28	0.18	1.33	-0.14	0.23	0.87	0.16*	0.05	1.17
Offender under influence	0.50*	0.25	1.65	0.52*	0.26	1.69	0.45*	0.05	1.57
Event Characteristics									
Private	0.39*	0.20	1.47	-0.17	0.24	0.84	0.39*	0.05	1.48
Public	0.52*	0.17	1.69	-0.24	0.34	0.79	0.24*	0.05	1.27
Daytime (7am to 7pm)	0.15	0.14	1.16	-0.16	0.17	0.85	-0.16*	0.03	0.85
Firearm	-2.38*	0.17	0.09	0.53	0.65	1.70	-1.54*	0.09	0.21
Knife	-1.78*	0.20	0.17	1.36*	0.43	3.89	-0.24*	0.07	0.79
Other weapon	-0.53*	0.20	0.59	0.74*	0.29	2.10	0.12*	0.05	1.12
Amarillo	0.40	0.23	1.49	1.07*	0.27	2.92	0.30*	0.05	1.34
Denton	-0.44	0.35	0.64	0.24	0.33	1.27	0.25*	0.08	1.29

El Paso	0.31	0.20	1.36	0.52*	0.23	1.68	0.68*	0.05	1.97
Plano	0.32	0.31	1.37	-0.55	0.48	0.57	0.17*	0.07	1.19
-2 log likelihood	1439.61			1039.51			22921.35		
Nagelkerke R^2	0.31			0.19			0.08		
Model x^2	345.14*			146.90*			1075.54*		

p<.05

Table 5. Multinomial Logistic Regression for Victim Injury Severity in Robberies (N=1,289)

	Minor Injury			Major Injury		
	b	*SE*	Exp(B)	*b*	*SE*	Exp(B)
Victim Characteristics						
Number of victims	0.07	0.12	1.07	-0.02	0.18	0.98
Victim age (average)	0.00	0.01	1.00	0.00	0.01	1.00
Victim(s) female	-0.43*	0.16	0.65	-1.02*	0.30	0.36
Mixed gender victim group	-0.13	0.32	0.88	0.22	0.44	1.24
Black, Non-Hispanic	0.27	0.22	1.31	0.10	0.34	1.11
Hispanic	0.27	0.17	1.31	0.30	0.26	1.35
Mixed	0.38	0.41	1.47	0.72	0.55	2.05
Victim resident	-0.11	0.23	0.90	0.44	0.41	1.55
Offender Characteristics						
Number of offenders	0.40*	0.09	1.49	0.46*	0.12	1.58
Offender age (average)	0.01	0.01	1.01	0.01	0.01	1.01
Offender(s) female	0.13	0.26	1.14	-0.90	0.63	0.41
Mixed gender offender group	-0.46*	0.23	0.63	-0.38	0.33	0.68
Black	0.10	0.17	1.10	0.23	0.26	1.26
Mixed	-0.76*	0.34	0.47	-0.45	0.48	0.64
Offender known to victim	0.24	0.19	1.27	0.50	0.29	1.65
Offender under influence	0.55*	0.26	1.74	0.30	0.38	1.35
Event Characteristics						
Private	0.26	0.21	1.30	0.83*	0.33	2.29
Public	0.49*	0.17	1.63	0.72*	0.29	2.04
Daytime (7am to 7pm)	0.16	0.15	1.18	0.09	0.23	1.09
Firearm	-2.59*	0.19	0.07	-1.50*	0.28	0.22
Knife	-1.97*	0.22	0.14	-0.93*	0.33	0.39
Other weapon	-0.75*	0.21	0.47	0.44	0.31	1.55
Amarillo	0.52*	0.24	1.68	-0.03	0.41	0.97
Denton	-0.41	0.37	0.66	-0.61	0.65	0.54
El Paso	0.40	0.21	1.49	-0.05	0.35	0.95
Plano	0.33	0.33	1.39	0.28	0.50	1.33
-2 log likelihood	1972.13					
Nagelkerke R^2	0.32					
Model x^2	410.99*					

*$p<0.05$

Table 6. Multinomial Logistic Regression for Victim Injury Severity in Sexual Offenses (N=1,009)

	Minor Injury			Major Injury		
	b	*SE*	Exp(B)	*b*	*SE*	Exp(B)
Victim Characteristics						
Number of victims	-0.46	0.36	0.63	0.17	0.45	1.18
Victim age (average)	0.06*	0.01	1.06	0.06*	0.01	1.06
Victim(s) female	0.52	0.34	1.68	-0.37	0.49	0.69
Mixed gender victim group	1.12	0.88	3.06	0.21	1.16	1.24
Black, Non-Hispanic	-0.23	0.36	0.79	-0.20	0.53	0.82
Hispanic	0.10	0.23	1.10	-0.39	0.39	0.68
Mixed	-0.32	1.16	0.73	-0.47	1.29	0.62
Victim resident	0.23	0.38	1.26	0.08	0.59	1.09
Offender Characteristics						
Number of offenders	0.25	0.17	1.29	0.18	0.25	1.20
Offender age (average)	-0.01	0.01	0.99	-0.01	0.01	0.99
Offender(s) female	-0.76	0.75	0.47	-19.77	0.00	0.00
Mixed gender offender group	0.13	0.93	1.14	0.39	1.28	1.48
Black	0.26	0.30	1.30	0.60	0.47	1.82
Mixed	-0.19	1.21	0.83	1.25	1.29	3.49
Offender known to victim	-0.29	0.26	0.75	0.57	0.46	1.76
Offender under influence	0.67*	0.30	1.95	0.62	0.45	1.86
Event Characteristics						
Private	-0.37	0.26	0.69	0.59	0.57	1.80
Public	-0.66	0.40	0.52	1.17*	0.67	3.21
Daytime (7am to 7pm)	-0.26	0.20	0.77	0.18	0.32	1.20
Firearm	0.07	0.79	1.07	1.16	0.82	3.18
Knife	1.32*	0.48	3.75	1.83*	0.60	6.26
Other weapon	0.72*	0.34	2.05	0.78	0.47	2.17
Amarillo	1.39*	0.30	4.01	-0.14	0.63	0.87
El Paso	0.56*	0.26	1.75	0.56	0.41	1.74
Plano	-0.18	0.50	0.84	-19.76	0.00	0.00
-2 log likelihood	1155.58					
Nagelkerke R^2	0.23					
Model x^2	184.93*					

$p<0.05$

Table 7. Multinomial Logistic Regression for Victim Injury Severity in Assaults (N=18,998)

	Minor Injury			Major Injury		
	b	*SE*	Exp(B)	*b*	*SE*	Exp(B)
Victim Characteristics						
Number of victims	-0.02	0.05	0.98	-0.04	0.08	0.96
Victim age (average)	0.00*	0.00	1.00	0.00	0.00	1.00
Victim(s) female	-0.08*	0.04	0.92	-0.90*	0.08	0.41
Mixed gender victim group	-0.28*	0.10	0.76	-0.70*	0.18	0.50
Black, Non-Hispanic	-0.19*	0.06	0.83	0.12	0.13	1.12
Hispanic	0.06	0.04	1.06	0.21*	0.10	1.24
Mixed	-0.24*	0.12	0.78	0.07	0.23	1.07
Victim resident	-0.01	0.07	0.99	-0.23	0.14	0.80
Offender Characteristics						
Number of offenders	0.28*	0.04	1.32	0.41*	0.06	1.50
Offender age (average)	0.00*	0.00	1.00	0.00	0.00	1.00
Offender(s) female	0.09*	0.04	1.09	-0.28*	0.10	0.75
Mixed gender offender group	-0.18	0.10	0.84	-0.18	0.17	0.84
Black	0.13*	0.05	1.13	0.17	0.11	1.18
Mixed	-0.16	0.15	0.85	-0.37	0.27	0.69
Offender known to victim	0.18*	0.05	1.20	0.05	0.10	1.05
Offender under influence	0.41*	0.05	1.51	0.77*	0.10	2.16
Event Characteristics						
Private	0.40*	0.05	1.50	0.18	0.11	1.19
Public	0.23*	0.05	1.26	0.18	0.11	1.20
Daytime (7am to 7pm)	-0.13*	0.03	0.88	-0.52*	0.08	0.60
Firearm	-2.05*	0.11	0.13	0.62*	0.14	1.86
Knife	-0.72*	0.08	0.49	2.14*	0.10	8.52
Other weapon	-0.05	0.05	0.95	1.75*	0.09	5.73
Amarillo	0.31*	0.06	1.36	0.19	0.12	1.20
Denton	0.26*	0.08	1.30	0.18	0.17	1.20
El Paso	0.73*	0.05	2.08	0.00	0.10	1.00
Plano	0.18*	0.07	1.20	0.16	0.15	1.17
-2 log likelihood	27203.55					
Nagelkerke R^2	0.17					
Model x^2	2768.11*					

*$p<0.05$